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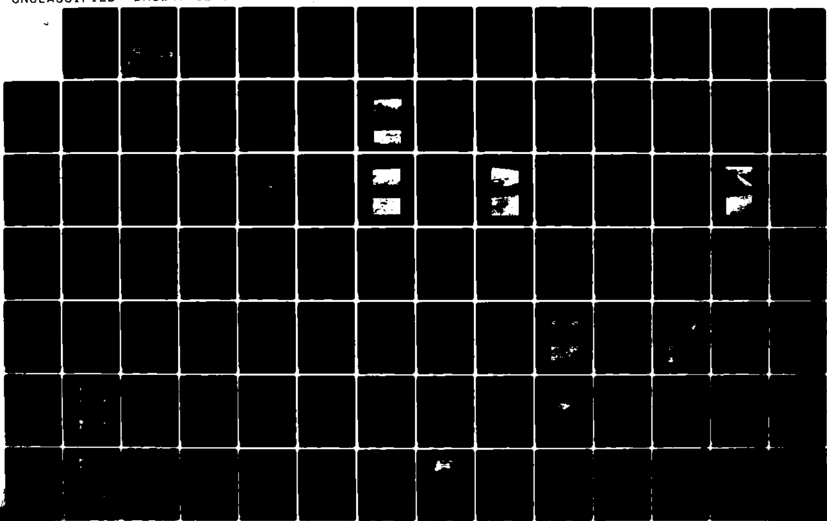

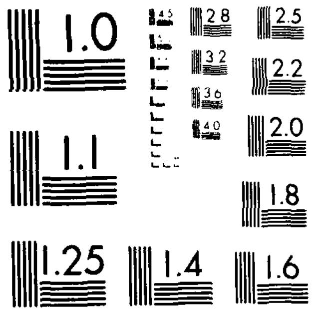

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INVESTIGATIONS AT SITE 32 (41EP325), KEYSTONE DAM PROJECT

A Multicomponent Archeological Site in Western El Paso County, Texas

by

ROSS C. FIELDS

and

JEFFREY S. GIRARD

Co-Principal Investigators:
Elton R. Prewitt and Ross C. Fields

Reports of Investigations, Number 21

Prewitt and Associates, Inc.
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CONTRACT DATA

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

Mitigation of the adverse effects of construction activities on Site 32 (EPCM:31:106:2:32, 41EP325) was carried out during May and June of 1982. The site is located in the impoundment area behind Keystone Dam, a part of the El Paso Flood Control Project, Northwest Area. The project was funded by the U.S. Army Corps of Engineers, Albuquerque District.

Site 32 appears to have been occupied predominantly during the Archaic period with a brief early Formative period component also represented. Radiocarbon samples obtained from three fire-cracked rock hearths yielded uncorrected age assays of 3650 yrs. B.P. ± 85, 2465 yrs. B.P. ± 60, and 1375 yrs. B.P. ± 70.

Features encountered at the site consist of fire-cracked rock hearths, dark-stained soil lenses probably representing disturbed hearths, and a pit of unknown function. The most common tool forms are simple flakes and unthinned cores with edge modification. Also recovered are a small number of shaped unifaces and bifaces, ground stone tools, hammerstones and ceramics. Pollen and macrobotanical remains were poorly preserved in the sandy site deposits.

The artifact and feature data suggest that Site 32 was occupied intermittently as a multipurpose campsite, possibly on a short-term basis, throughout its occupation. A narrowing in the range of activities carried out at the site from the mid to late Archaic is evident and appears to have involved a reduction in the importance of leaf-succulent processing, seed processing and possibly hunting.

ACKNOWLEDGMENTS

A number of people have contributed to the successful completion of this project. First, we would like to thank Jan Bie 'a of the U.S. Army Corps of Engineers, Albuquerque District for her assistance, guidance and advice throughout the project. Secondly, our stay in El Paso was made more pleasant and more productive by the hospitality and help of the members of the El Paso Archeological Society, especially Carrol and Jack Hedrick, and the staff of the Wilderness Park Museum. Fermin Dorado, the El Paso City Engineer, is also thanked for providing information on the Keystone Dam specifications.

Consultation and special analyses were provided by Beta Analytic, Inc. of Coral Gables, Florida (radiocarbon dating), Vance Holliday of the University of Colorado (geology), Mollie S. Toll of the Castetter Laboratory for Ethnobotanical Studies at the University of New Mexico (macrobotanical remains), Anne Cully of the Castetter Laboratory (pollen), and Paul Storch of the Texas Memorial Museum at The University of Texas at Austin (faunal remains). We appreciate their cooperation and advice. Tom O'Laughlin and Rex Gerald of The University of Texas at El Paso shared with us what they knew about the site, and Tom generously provided review comments on the draft of this report. We would also like to thank others, in addition to Tom O'Laughlin and Jan Biella, who reviewed the draft -- the Texas Historical Commission; the U.S. Army Corps of Engineers, Southwest Division; the National Park Service, Interagency Archeological Services Branch; and the U.S. Army, Fort Bliss.

A ve y special thanks goes to all of the individuals who worked on the field and laboratory crews: Max Miller and Darrell Creel (crew chiefs); Jerrilyn McLerran, Pegi Jodry, Margaret Howard, Jan Stokes, Susan Lisk, Mark Cartwright, Jan Guy, Jody Pevey, Bob Stiba, Sandra Hannum Price and Cynthia Banks (crewmembers); Sue Andrews (laboratory supervisor); and Ranel Stephenson, Debbie Lebo, Ron Wendt and Martin Salinas (laboratory crew).

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CHAPTER I

INTRODUCTION

This report describes investigations carried out at a prehistoric archeological site (EPCM:31:106:2:32), hereafter referred to as Site 32, in western El Paso County, Texas (Fig. 1) by Prewitt and Associates, Inc. for the U.S. Army Corps of Engineers, Albuquerque District. The trinomial designation for the site is 41EP325. Site 32 will be in the impoundment area behind, and will be used as borrow fill to construct, a 4,950-ft-long and 56-ft-high earthen dam, called the Keystone Dam, which is to be part of the El Paso Flood Control Project, Northwest Area. This flood control project is intended to protect the City of El Paso from flooding resulting from runoff originating in the Franklin Mountains. Site 32 will be destroyed during dam construction, and the investigations reported here constitute a mitigation of these adverse impacts. The report presents a full accounting of these mitigation efforts. This project has been carried out to meet requirements set by the National Historic Preservation Act of 1966, as amended and 36 CFR, Part 800. This introductory chapter contains an account of the history of the Keystone Dam Project, a brief description of Site 32 and the work accomplished, and an outline of the organization of the report.

History of the Keystone Dam Project

The El Paso Flood Control Project, Northwest Area will be comprised of four dams, two diversion ditches, and an outlet conduit. The project is designed to control runoff over an approximately 26-km^2 area between the Franklin Mountains and the Rio Grande. The Keystone Dam is one of these four dams. An archeological survey in 1976 of areas to be affected by construction activities associated with this flood control project located eighteen prehistoric sites, eight of which were assessed to be eligible for nomination to the National Register of Historic Places (Gerald 1976). Site 32 was one of these eight sites and, as originally recorded, was described as covering about 14,500 m^2, having two fire-cracked rock hearths visible on the surface, and having a moderate density of chipped stone tools and debitage on the surface (Gerald 1976:21).

The results of a second phase of archeological investigations at these eight sites are presented in a report published by the El Paso Centennial Museum, The University of Texas at El Paso (O'Laughlin 1980). This second phase involved surface mapping, surface collection, and subsurface testing of three sites (EPCM:31:106:2:29, 33 and 34). The report provided an ". . . evaluation and recommendation of the potential adverse effects on these three sites and five others (EPCM:31:106:2:31, 32, 35, 36 and 37). . . ." (O'Laughlin 1980:1).

Sites 29, 33 and 34 were chosen for testing during this second phase because each represented a different kind of site (O'Laughlin 1980:1). Site 29 appeared to be a typical small site with a low artifact density. Site 34 was selected as being representative of medium-sized sites with higher artifact densities than the small sites. Site 33 was chosen because it was the largest of the eight sites and had high artifact densities, numerous hearths, and evidence of structures.

INVESTIGATIONS AT SITE 32

In revisiting and reassessing Site 32 in the second-phase investigations, O'Laughlin determined that: (1) the site had a denser scatter of artifacts than was previously thought; (2) a small number of previously unnoticed brownware sherds were present on the surface; (3) a greater number (possibly 13) of fire-cracked rock hearths than was first recorded were present on the surface; (4) an ashy deposit (5-15 cm thick) was present over part of the site; and (5) subsurface features were likely to exist at Site 32. O'Laughlin stressed that the primary occupation of Site 32 appeared to date to the Archaic period, that Site 32 could relate temporally to Site 35 where Archaic structures were found, and that ". . . a program of mitigation must be designed to recover the maximum amount of information possible" (O'Laughlin 1980:238).

Based on O'Laughlin's assessments, the U.S. Army Corps of Engineers, Albuquerque District, requested a Determination of National Register Eligibility for Site 32 and four others (Sites 33, 34, 36 and 37). The site was determined eligible in February 1980. The Keystone Dam was then partially redesigned to lessen adverse impacts on Sites 33 and 34, and in the summer of 1981 a request for proposals for mitigation efforts at Site 32 was issued by the Albuquerque District. As of this writing, no mitigative measures have been undertaken at Sites 36 and 37.

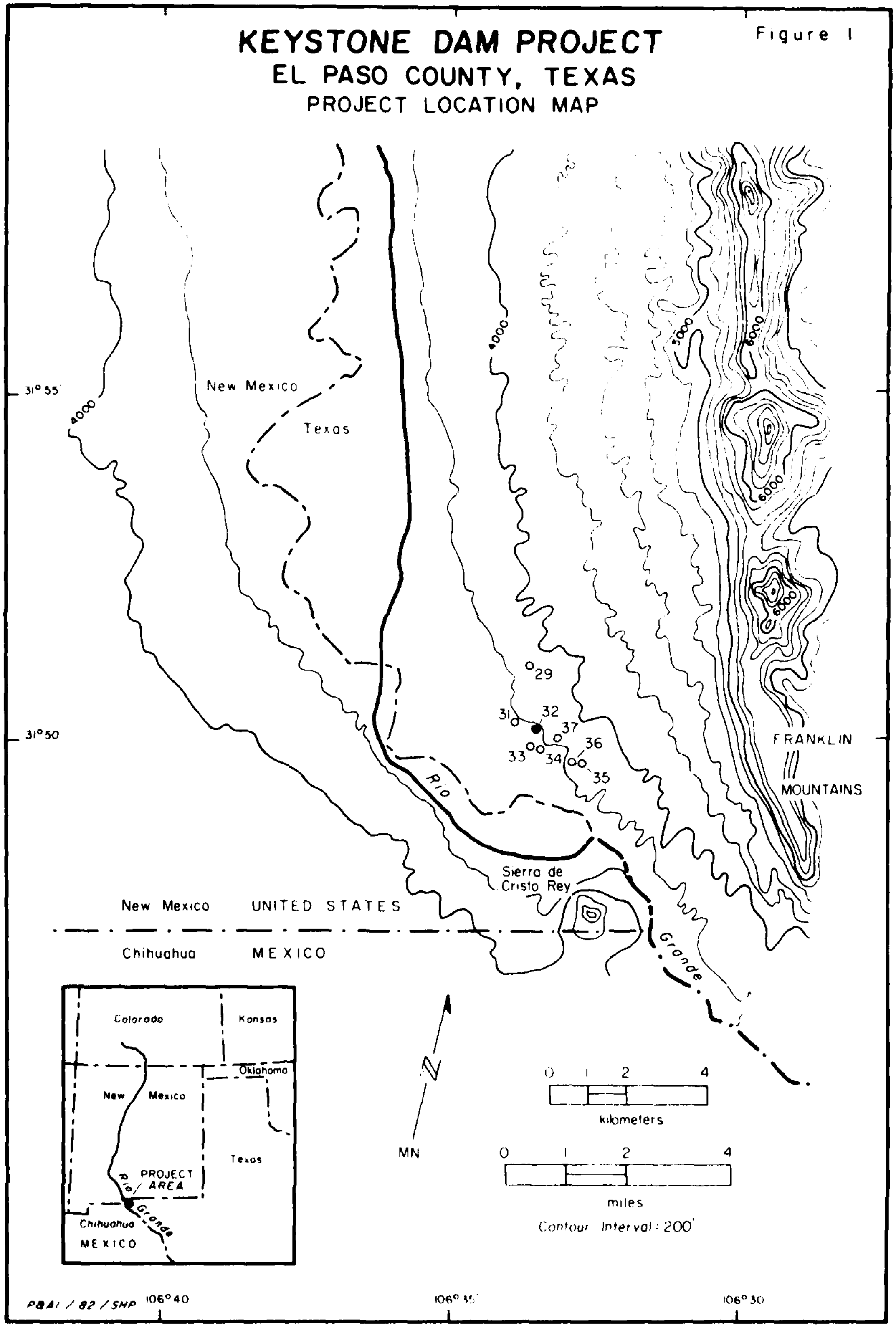
In October 1981, Prewitt and Associates, Inc. submitted a proposal for the mitigation work at Site 32, and after some proposal revisions, the contract was awarded and notice to proceed was given in late February 1982. After a six-week planning phase (Phase I) and a two-week review phase, fieldwork (Phase II) was begun on May 3, 1982 and completed on June 18, 1982. The 21-week analysis and report preparation phase (Phase III) commenced on June 21, 1982 and was completed with the submission of the draft of this report on November 12, 1982.

Site 32 and the Work Accomplished

Site 32 is within the city limits of El Paso, Texas, about 6 km west of the peaks of the Franklin Mountains and 3 km northeast of the present course of the Rio Grande (Fig. 1). The site lies on a gently sloping dissected terrace about 18 m above the current Rio Grande floodplain (Fig. 2). Cultural materials occur over a 12,600-m^2 area but are most concentrated in the 6,000-m^2 central part of the site (Fig. 3). This central area is covered with a mantle of loose gravelly sand up to 80 cm thick which contains the cultural deposits; the peripheral areas are largely covered with a gravel pavement, have been badly deflated, and do not have subsurface cultural deposits.

Fieldwork at Site 32 [illegible] d during two periods -- a ten-day site visit in March and the seven-week intensive [illegible] ion period in May and June. The ten-day site visit was part of the Planning Pha[illegible] nd was intended to provide information on the horizontal and vertical extent [illegible] to aid in the preparation of a Planning Document. This Planning Document i[illegible] program Research Design. Tasks carried out during this Phase I site visit inclu[illegible] ablishing two arbitrary grid baselines, setting five permanent vertical reference system data, making a topographic map of the site, and excavating seven 1x1-m test pits.

The program Planning Document outlined seven main on-site tasks to be accomplished during the Phase II intensive fieldwork. Two of these, mapping and extension of the grid,



KEYSTONE DAM PROJECT
EL PASO COUNTY, TEXAS
PROJECT LOCATION MAP
Figure 1
New Mexico
Texas
4000
5000
6000
29
31
32
33
34
35
36
37
Rio Grande
FRANKLIN MOUNTAINS
Sierra de Cristo Rey
New Mexico
UNITED STATES
Chihuahua
MEXICO
Colorado
Kansas
Oklahoma
New Mexico
Texas
PROJECT AREA
Rio Grande
Chihuahua
MEXICO
MN
0 1 2 4
kilometers
0 1 2 4
miles
Contour Interval: 200'
31°55'
31°50
106°40
106°35'
106°30
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Figure 2. General Site Views.

a. View to the north of the terrace containing the site from a lower terrace, Franklin Mountains in background.

b. View to the south across the site and the Rio Grande floodplain.

Figure 2

a

b

were continuations of work begun in Phase I. The remaining five tasks were begun and completed during Phase II and involved (Fig. 3): (1) a 100 percent surface collection of a 6,032-m^2 area covering the central part of the site and of 22 16-m^2 areas distributed systematically around the site periphery; (2) mapping of 11 surface features and excavation of 20.75 m^2 of trenches into these features; (3) excavation of 302 linear m of backhoe trenches; (4) excavation of 25 1x1-m pits spaced systematically over the central portion of the site; and (5) excavation of 165.5 m^2 of the main site area in three block excavation units, Units 1, 2 and 3. Unit 1 covered 95.5 m^2 (including 1 m^2 excavated in Phase I); Unit 2 encompassed 72 m^2 (including 7 m^2 excavated during Phase I or in surface feature investigation); and Unit 3 covered 6 m^2. Squares in Unit 1 were excavated to a mean depth of 33 cm below ground surface; squares in Unit 2 averaged 42 cm in depth; and Unit 3 squares averaged 59 cm in depth. The work accomplished in this program is described in more detail in Chapter V.

Organization of the Report

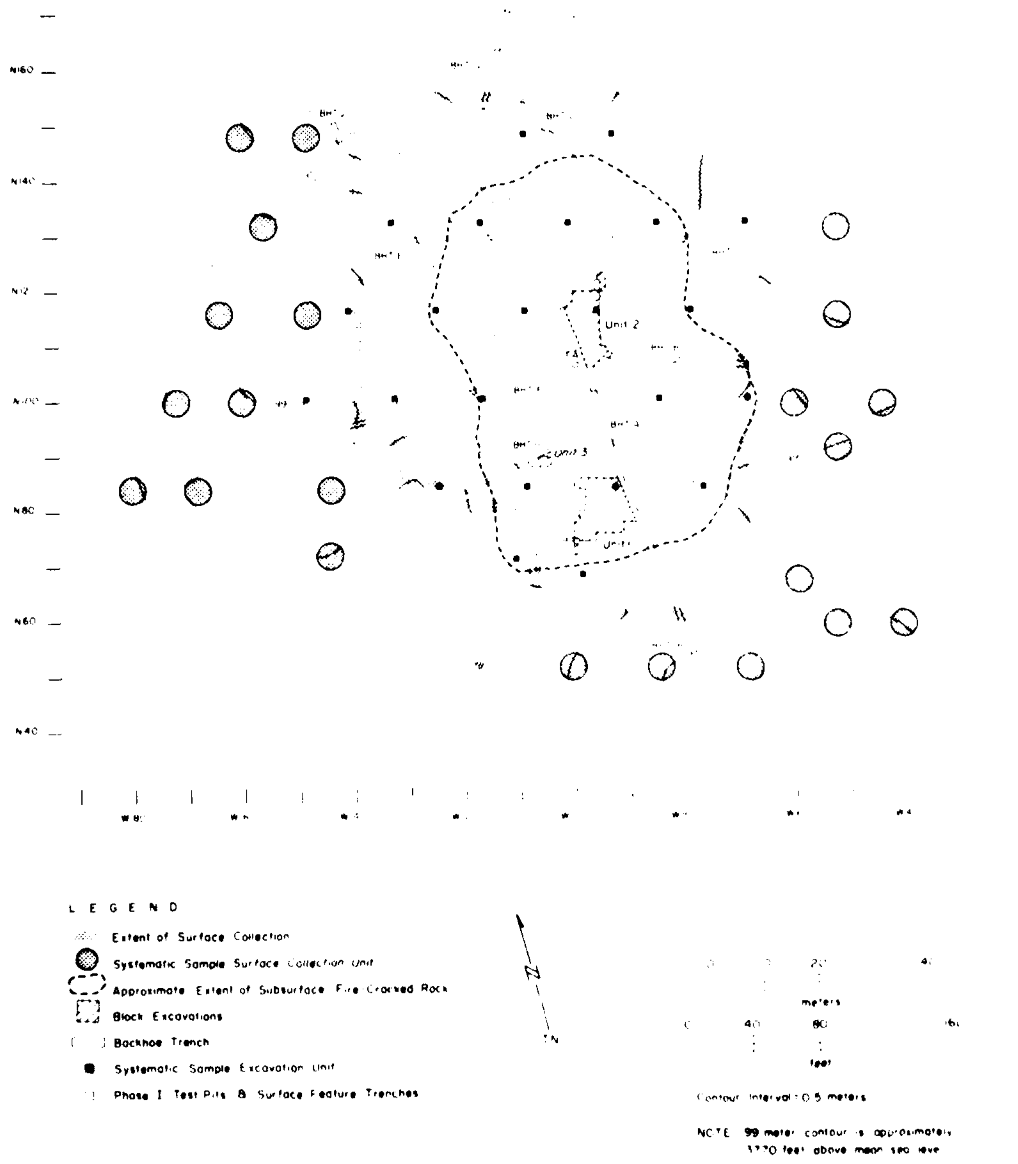
This report is composed of twelve chapters and seven appendices. Chapter II summarizes the Corps of Engineers' Scope of Work, the theoretical orientation which has guided this research and the program research topics. Chapter III contains descriptions of the environment of the project area in order to identify natural processes affecting the cultural remains and environmental parameters affecting cultural adaptations in the area. Chapter IV discusses the culture history of the El Paso area and summarizes previous archeological investigations. Chapter V describes and evaluates the methods used for each phase of the investigations and describes the work accomplished. Chapter VI describes the cultural features at Site 32, discusses the methods and limitations of the feature analysis, compares these data to those from other sites, and uses the feature evidence in addressing the research questions outlined in Chapter II. Chapters VII through IX present descriptions and analyses for the three main artifact classes -- chipped stone; ground, pecked and battered stone; and ceramics. Chapter X presents the results of four special analyses -- radiocarbon dating, macrobotanical, pollen and faunal. Chapter XI synthesizes the previous five chapters and focuses on the vertical distributions of the cultural remains to examine changes in site function through time. Implications for subsistence and settlement systems also are studied. Chapter XII summarizes the previous chapters. Appendices A through G consist of the reports of the geologic, palynological and flotation sample analysis consultants; a description of the historical material recovered from the site; a tabulation of functional attributes for the major chipped stone tool classes; a listing of proveniences assigned to each of the site components; and a listing of the numbers of artifacts recovered from each minimum provenience unit.

Figure 3

KEYSTONE DAM PROJECT

SITE 32

TOPOGRAPHIC MAP



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CHAPTER II

SCOPE OF WORK AND RESEARCH DESIGN

The purpose of this chapter is (1) to summarize the Scope of Work issued by the U.S. Army Corps of Engineers, Albuquerque District, for the mitigation of Site 32; (2) to outline the theoretical orientation and particular settlement system models that have guided the research; and (3) to present the research topics which are addressed in these investigations.

Summary of the Scope of Work

Prior to the mitigation program, information concerning Site 32 was based on surface investigations by Gerald (1976) and O'Laughlin (1980). Because of the widespread scatter of lithic artifacts and relatively light scatter of ceramics, the site was recognized as having been occupied primarily during the Archaic period and briefly during the early Formative period (Mesilla Phase). O'Laughlin (1980:229) proposed several research questions for investigation of Site 32. These questions, listed below, focus on comparison of data from Site 32 with that obtained in the testing of Site 33 and 34.

1. Are the sites of roughly the same time period or not? Can a chronology be developed for future testing?

2. Are the site contents different? Do they represent different types of sites which are products of different segments of the same organization or do they represent different subsistence, social organization, and settlement patterns?

3. Do the spatial association of artifacts and facilities reflect similar types or sizes of social groups, and if Site 33 represents a base camp, which seems possible, is an argument for central based wandering supported?

4. Do lithic procurement and reduction strategies reflect low or high mobility of the social groups?

5. How important were leaf succulents in the subsistence base, and how important were corn and other domesticates?

6. Is the Archaic more or less mobile and dependent upon a narrower or a broader range of resources than are suggested for the later Mesilla phase? Are changes in subsistence, social organization, and settlement patterns due to increasing population pressure, environmental change, or a combination of factors? (O'Laughlin 1980:239).

The Scope of Work requested a three-phase mitigation program. The Planning Phase (Phase I) consisted of: (1) a 10-day site visit to gather information concerning the nature and extent of cultural remains and to do preliminary mapping and grid work; and (2) preparation of a Planning Document (PD) outlining the testing results, the proposed research design, and the proposed scheduling and logistical arrangments for the subsequent phases.

The Fieldwork Phase (Phase II) was estimated to require seven weeks for completion using two crews and was scheduled to start after a two week period (following Phase I) during which the Planning Document was to be reviewed.

The Analysis and Report Preparation Phase (Phase III) was to begin immediately following Phase II and was to require 21 weeks for completion. This phase was to result in a comprehensive draft report describing all phases of the mitigation program.

Theoretical Orientation

The theoretical basis for this study involves two assumptions -- one concerns the nature of culture; the other concerns the nature of the archeological record -- which structure the manner in which the research has been carried out.

First, culture is viewed as an adaptive system which is part of a larger ecosystem and is composed of a number of subsystems (Clarke 1978; Watson et al. 1971). Elucidation of the way cultural systems operate is considered the ultimate goal of archeology, and the subsystems of cultural systems are seen as useful units of study. No attempt is made here to address questions concerning ultimate causes of cultural change. However, this study is directed toward the investigation of human interaction with the natural environment as an important means for understanding and explaining the operation, through time, of cultural systems. Our research focuses on the technological subsystem, particularly subsistence technology. We are concerned primarily with how prehistoric peoples acquired and used natural resources, and how they organized themselves spatially in carrying out these activities.

The second assumption is that patterned behavior results in patterning in the archeological record. There has been considerable debate in recent years over the use and abuse of this assumption, but it is maintained here that the assumption, when employed judiciously, is both useful and essential in studying prehistoric behavior. It is stressed, however, that patterning in the record may be affected by a wide variety of cultural and noncultural factors and that potential factors must be weighed very carefully in assessing any observed patterns or lack of patterning.

Settlement Systems

The research questions proposed by O'Laughlin and presented in the Scope of Work are derived from his model of subsistence and settlement system changes during the Archaic and early Formative periods. Briefly this model states that:

(1) Archaic period populations in the project area had a broad-spectrum gathering and hunting subsistence and a settlement system involving (a) large sites east of the Rio Grande which were situated to have access to a wide range of environmental zones and which were used as base camps and possibly as semipermanent residential sites during some parts of the year, and (b) small, widely scattered camps situated for the utilization of particular resources or sets of resources.

(2) Early Formative period (Mesilla Phase) groups had a mixed horticultural and gathering/hunting subsistence and a settlement system involving (a) semipermanent or permanent residential sites west of the Rio Grande situated to take advantage of the most favorable conditions for horticulture, and (b) small, widely distributed special-purpose camps.

Based on the size of Site 32, its location on the bajada between the Rio Grande and the Franklin Mountains and well away from areas thought to be best suited for horticulture, and the nature of the artifacts and features on the surface, it was initially proposed that the site was used during Mesilla Phase times on a short-term basis as a special-purpose camp (i.e., for the processing of leaf succulents obtained in the upper bajada and mountain zones east of Site 32), and during Archaic period times on a longer term basis, perhaps as a base camp, where a wide variety of maintenance and extractive activities were performed. However, during the fieldwork and analysis, it was discovered that most of the cultural materials resulted from Archaic period occupations and that Mesilla Phase remains were quite sparse. Thus, the research strategy was changed to focus on cultural systems during the Archaic period.

Rather than employing a simple residential site-campsite dichotomy, O'Laughlin's hypotheses concerning Archaic period settlements in the project area are expanded here using Binford's (1980) ideas concerning general organizational components of hunter-gatherer systems. The generated hypotheses and test implications admittedly are overly simplistic relative to the actual complexities involved in the formation of the Site 32 archeological record, but hopefully they will be useful as a step in the process of understanding Archaic period adaptations in the El Paso area.

Binford has differentiated forager strategies involving high residential mobility in the exploitation of spatially dispersed resource areas from collector strategies involving less mobile residences and logistically organized resource procurement parties. Foragers gather food daily on an encounter basis with daily return to a residential base (Binford 1980:5). Two types of archeological manifestations result from foraging strategies. The first type represents the residential base which is ". . . the hub of subsistence activities, the locus out of which foraging parties originate and where most processing, manufacturing, and maintenance activities take place" (Binford 1980:9). Residential bases are moved frequently as resources are exhausted or seasonally available. The second site type is the location where extractive tasks are exclusively carried out. Locations are occupied only for a very limited period of time, only limited materials are processed, and few material remains are left behind. Binford (1980:10) suggests that locations may be visible archeologically as scattered isolated finds rather than as recognizable sites.

Collector strategies are characterized by: "(1) the storage of food for at least part of the year and (2) logistically organized food-procurement parties." This strategy generates three site types in addition to residential bases and locations. First, is the field camp where the task group ". . . sleeps, eats, and otherwise maintains itself while away from the residential base." Stations ". . . are sites where special-purpose task groups are localized when engaged in information gathering, for instance the observation of game movement or the observation of other humans" (Binford 1980:12). Because resources for large groups are procured by smaller groups, temporary storage often is necessary which results in the third site type, caches.

Binford emphasizes that forager and collector strategies should not be viewed as being in opposition to one another but rather they represent ". . . a graded series from simple to complex" (Binford 1980:12). Also, employment of various mixes of strategies in different settings may result in very complex archeological patterning on a long-term basis (Binford 1980:19). Nevertheless, these organizational components may be of use in aiding in the understanding of Archaic adaptations in the project area.

Hypothesis 1: Foraging Settlement System

The first hypothesis guiding the research at Site 32 is that Archaic adaptations tended toward foraging strategies. Residential groups would have been highly mobile, changing locations seasonally to take advantage of the widest range of resources then available. Small foraging groups may have actually procured resources, but these groups would not have had to wander far, and storage or processing of resources away from camps would not have been necessary. Site 32 would represent a residential site in this scenario, where a full range of residential activities were carried out including the processing of procured food items. The site would have been occupied repeatedly yet intermittently on a seasonal or probably even more ephemeral basis. Expected archeological correlates are: (1) nonpermanent structures due to the ephemeral nature of the occupations; (2) a wide variety of feature and artifact forms due to the wide range of activities carried out at the site; (3) absence of a spatially discrete midden area due to repeated short-term occupations; (4) very complex patterning of feature and artifact distributions also due to repeated occupations; and (5) a range of perishable (food) items limited to those obtainable within a one-day foraging distance of the site. O'Laughlin (1980:234) notes that, in the winter, water and many plant and animal resources are available or more abundant near the Rio Grande than in more distant areas and suggests that perhaps winter would have been a likely time for residential groups to have occupied the project area.

Hypothesis 2: Collector Settlement System, Residential Base

The second hypothesis is that Archaic adaptations tended toward a collector strategy with Site 32 representing a residential base. This hypothesis suggests that residential locales were less mobile, being occupied on at least a seasonal basis. Specialized resource procurement parties traveled greater distances to extract and perhaps process and store resources before returning to the residential base. Probable archeological correlates include: (1) semipermanent or permanent structures; (2) a wide variety of feature and artifact forms due to the wide range of activities carried out at the site; (3) possible presence of a spatially discrete midden area; (4) identifiable horizontal patterning of feature and artifact distributions formed from long-term occupations; and (5) a wide range of perishable items including items not available within a day's foraging distance.

Hypothesis 3: Collector Settlement System, Field Camp

The third hypothesis also projects that Archaic adaptations tended toward a collector strategy, but in this case Site 32 represents a series of field camps occupied by

specialized members of the primary social group during resource (possibly upland leaf succulents) procurement expeditions. The main encampment of the social group would have been located some distance away in a zone offering a different set of resources. Minimal domestic activities would have been carried out at Site 32, but resource processing and storage might be represented if the site also served as a location. Occupations would be ephemeral (duration of only a few days) and repeated. Expected archeological correlates include: (1) absence of structures; (2) a limited range of feature and artifact forms, or the dominance of a limited number of forms due to the specialized nature of most activities; (3) absence of a spatially discrete midden area due to numerous short-term, overlapping occupations; (4) complex patterning of feature and artifact distributions also due to numerous short-term, overlapping occupations; and (5) a very limited range of perishable items due to the specialized nature of the procurement activities.

The remaining logical possibilities for the role of Site 32 in this framework (i.e., simple location, station or cache) all can be eliminated immediately because of the size and density of cultural materials at the site.

Research Topics

Settlement system models in the El Paso area have been constructed primarily using data from surface reconnaissance and very limited subsurface testing (e.g., O'Laughlin 1979, 1980; Whalen 1980). Criteria used for classification of sites into categories relevant to the model in most cases necessarily assume an unchanging site function within broad temporal periods. An advantage of the relatively extensive excavations at Site 32 is that problems of intrasite chronology can be addressed in addition to problems of function. Testing of the hypotheses stated above involves some separation of periods of occupation as well as reconstruction of activities pertaining to the identified occupations.

Chronological problems at Site 32 are divided into two major areas of concern: (1) identification and relative ordering of the major site occupations; and (2) relationships of the major occupations to the regional chronology. Because the site deposits are not well stratified, discrete occupational episodes cannot be defined. However, in Chapter VI, variability in the vertical densities of fire-cracked rocks is used to define broad occupational zones which are used in this study to investigate differential use of the site through time. Relating the major occupations of Site 32 to the regional chronology is carried out through presentation of C-14 dates obtained from three fire-cracked rock features. These dates, projectile point styles, and the confinement of ceramics to the surface and upper deposits firmly place the major site occupation in the Archaic period.

The range of activities carried out at Site 32 is investigated through analysis of attributes and vertical distributions of artifacts and features. Although direct evidence concerning the function of the features found at the site is lacking, O'Laughlin's (1980) argument that fire-cracked rock hearths were special-function features and the vertical distribution of these hearths and hearth by-products in the Site 32 deposits are employed in this study to examine changes through time in the relative importance of certain activites at the site.

The study of site function through artifact analysis is based largely on O'Laughlin's (1980:197-210) suggestion that: (1) chipped stone tools used in the processing of leaf

succulents consist primarily of relatively large coarse cutting, chopping, and shredding tools; and (2) a wider range of tools, such as small utilized flakes, projectile points, and ground stone implements, would reflect a wider range of activities being performed. Analysis of the lithic tools from Site 32 is directed toward definition of the various reduction sequences carried out to produce various tool forms, and toward classification of these forms into functionally meaningful categories for the purpose of reconstruction of the range of activities carried out.

Discussion

Descriptions and analyses presented in the chapters which follow are intended to address the research topics of site chronology and site function with the ultimate goal of evaluating the test implications relating to the settlement hypotheses.

The first test implication relates to the presence and nature of structures at Site 32. As discussed in Chapter VI, no direct evidence of structures of any sort was encountered, although the possible presence of structures at the site cannot be discounted completely because of possible lack of preservation. However, the negative evidence argues against the hypothesis that Site 32 represents a residential base in a collector settlement system.

The second test implication concerns the variety of feature and artifact forms present at the site. This information is presented in Chapters VI through IX, with differences between occupational periods given in Chapter XI. A single type of feature, fire-cracked rock hearths, clearly dominates at the site although the number of hearths differs significantly between different occupational periods. Investigations of activities associated with these features have been frustrated by poor preservation of perishable materials and pollen, and by a lack of demonstrably associated artifacts. Using O'Laughlin's (1980) suggestion that these features are specialized toward the processing of leaf succulents, it appears that this activity was of primary importance at Site 32 during one occupational component, but differences are observable through time (see Chapter XI). A small number of pit features hint that some caching of perishables was carried out, but problems with preservation make adequate determination of this possibility impossible. Chipped and ground stone artifacts indicate that a variety of maintenance and processing tasks were carried out at the site, although only a small number of shaped, specialized tools are present. There appears to be a great deal of redundancy in the assemblages for each component, although differences in quantities of ground stone suggest that seed-processing activities varied in importance. Overall, the feature data provide general support to the hypothesis that Site 32 served as a field camp for the processing of leaf succulents at least during one occupational period. However, the artifact data suggest that a varied set of activities were carried out during all occupational periods.

The third test implication concerns the presence of a spatially discrete midden area. Distributional maps presented in Chapter XI provide some evidence that some localized dumping of cultural material may have occurred during at least one occupational period, but well-defined midden areas are absent at Site 32. Thus, the evidence suggests that Site 32 predominantly represents a series of intermittent, short-term occupations.

The fourth test implication concerns horizontal patterning of artifacts and features. Distribution maps of selected artifact and feature categories are provided in Chapter XI for each component, and the raw data for each artifact class are provided by excavation level in Chapters VII through IX. The patterning is very complex and further supports the idea that a series of intermittent, relatively short-term occupations occurred at Site 32.

The final test implication relates to the nature of perishable items, particularly food items, present in the site deposits. Unfortunately, the lack of preservation of such materials (Chapter X) precludes evaluation of the components in terms of this test implication.

The data and analyses presented in the following chapters appear to most strongly support the hypothesis that Site 32 represents a field camp in a settlement system oriented toward a collector strategy, although differences between occupational periods may be present (see Chapter XI). However, the density of cultural material in some portions of the site and the presence of a moderately wide range of tool forms suggest occupations of relative intensity and long duration. Thus, a forager-oriented strategy involving occupation of Site 32 by a more inclusive social group cannot be discounted.

There are clear differences in the natures of the Archaic period occupations between Sites 32 and 33. Very different projectile point forms and differences in radiocarbon dates suggest that occupation of the sites may have only partly overlapped temporally, and that different settlement systems may be represented. Regional settlement pattern data presented by O'Laughlin (1980:28-29) indicate that Archaic period residential sites tend to be located near the Rio Grande. Although Archaic camps often are found in upland areas (upper bajada, mountains), they also occur in the lower bajada areas, and the presence of a repeatedly occupied field camp at Site 32 would not be anomalous in the project area. However, it is felt that published data concerning the nature of individual occupations at sites in the area simply are not adequate to confidently assess the settlement system hypotheses at this time. Hopefully, future excavations and surface surveys will help clarify the role of Site 32 in regional settlement systems.

CHAPTER III

ENVIRONMENTAL SETTING

This chapter describes the geology, geomorphology, soils, climate, hydrology, vegetation and fauna of the project area. The main goals are to identify environmental parameters relevant to understanding cultural adaptations and to identify natural processes which might have affected the cultural remains.

Geology, Geomorphology and Soils

This section draws heavily on the results of Holliday's investigations at Site 32 (Appendix A) and on O'Laughlin's (1980:6-11) descriptions of the physical geography of the El Paso area. Relevant primary sources used by Holliday and O'Laughlin include Kottlowski (1958), Strain (1966), Metcalf (1969), Hawley and Kottlowski (1969), Hawley et al. (1969), Hawley (1978), Gile (1979) and Gile et al. (1981).

Regional Geology

The Keystone Dam project area is located in the Mexican Highlands section of the Basin and Range physiographic province. The area has north-south-trending fault block mountain ranges which are composed of Precambrian, Paleozoic, Mesozoic and Cenozoic rocks and which were faulted and uplifted during the Tertiary period. Detritus eroded from these uplifted mountains has filled the broad intermontane basins, often to great depth.

The dam site is located at the southern end of one of these basins, the Mesilla Bolson (Fig. 4). Until the mid-Pleistocene, this bolson was closed. The floor of the basin at that time was about 90 m above the present Rio Grande level and is represented today by the broad, level La Mesa Surface, located primarily on the western side of the bolson (Fig. 5a). In the mid-Pleistocene, the ancestral Rio Grande developed a through-drainage in the vicinity of El Paso which emptied the Mesilla Bolson (which had been occupied by a part of Lake Cabeza de Vaca) and allowed the river to begin entrenchment.

Subsequent episodes of valley cutting and backfilling have resulted in a series of stepped surfaces (Fig. 5b) and deposits representing both depositional and erosional processes. Four of these major surfaces and deposits have been identified in both the El Paso area (the southern end of the Mesilla Bolson) and the Las Cruces, New Mexico area (the northern end of the bolson). Holliday's investigations indicate that Site 32 lies on the third-oldest of these, the Picacho-Gold Hill, which was deposited some 25,000 to 75,000 years ago.

Local Geology

The alluvial terrace containing the site rises about 18 m above the present floodplain and is bordered on the northeast and southwest by older and younger terraces. The

area is heavily dissected by a series of northeast-southwest-trending arroyos of Holocene age (Fig. [illegible]). Site 32 is bordered on the northwest by a large, deep (ca. [illegible] m), linear arroyo and on the southeast by a smaller, probably younger, dendritic arroyo. Both of these drainages originate between the project area and the Franklin Mountains, the larger one about 2.4 km northeast of Site 32 and the smaller one about [illegible] km northeast of the site area (these distances are derived using contours on the Smeltertown, Texas-New Mexico USGS 7.5' topographic map).

The portion of the terrace containing Site 32 is different from most of the nearby terrace surfaces in that it is covered by a fairly extensive and thick mantle of eolian sand. This sand mantle appears to have accumulated during the middle and late Holocene in a channel scoured into the Picacho-Gold Hill surface.

Site Stratigraphy

Of the five stratigraphic units identified at Site 32 by Holliday, the three earliest (Strata 1-3) are parts of the Picacho-Gold Hill deposit while the latter two (Strata 4 and 5) are Holocene eolian sediments containing the cultural materials (Fig. 7). The terminology used here, unlike the terminology used in the field descriptions of backhoe trench profiles, differentiates between depositional units (the five above) and soil horizons.

Stratum 1 is an ubiquitous gravel deposit encountered at 1 m or less below the ground surface (Fig. 8). Cobbles of limestone, rhyolite, metaquartzite and chert (generally 5-20 cm in diameter) make up this deposit. This unit, which outcrops at the surface in the deflated peripheral parts of the site and along the terrace edges around the site, served as a major source of raw material for chipped stone tools and hearth rocks for the inhabitants of Site 32.

Stratum 2 is a 10-20-cm-thick gravelly sand deposit which overlies Stratum 1. In some parts of the site, Stratum 2 has been removed by the channel cutting which scoured the Picacho-Gold Hill surface. In Backhoe Trench H, this stratum underlies a gravel lens (Stratum 3) which is clearly a part of the Picacho-Gold Hill deposit. Thus, Stratum 2 deposition must also date to the late Pleistocene and predate the human occupation of Site 32.

Stratum 3 is similar to Stratum 1 and consists of gravels. It is most apparent at the southern end of Backhoe Trench H but had been almost entirely removed over the rest of the site during the late Pleistocene channel cutting.

Stratum 4 is a calcareous sand which contains the cultural remains. Although primarily eolian, this stratum also contains a moderate amount of small pebbles (1-2 cm in diameter) which apparently reflect some colluvial deposition. Stratum 4 occurs only over a 6300-m^2 central portion of Site 32 and has a maximum thickness of about 80 cm. This unit is extremely homogeneous and cannot be subdivided into depositional units. Thus, stratigraphic correlations of the cultural deposits within Stratum 4 are essentially precluded. Based primarily on subtle color changes, weakly developed soil horizons have been defined within Stratum 4. As Holliday notes, however, because these soils are weakly developed does not necessarily indicate that they are very young.

Figure 4

KEYSTONE DAM PROJECT

REGIONAL PHYSIOGRAPHIC MAP

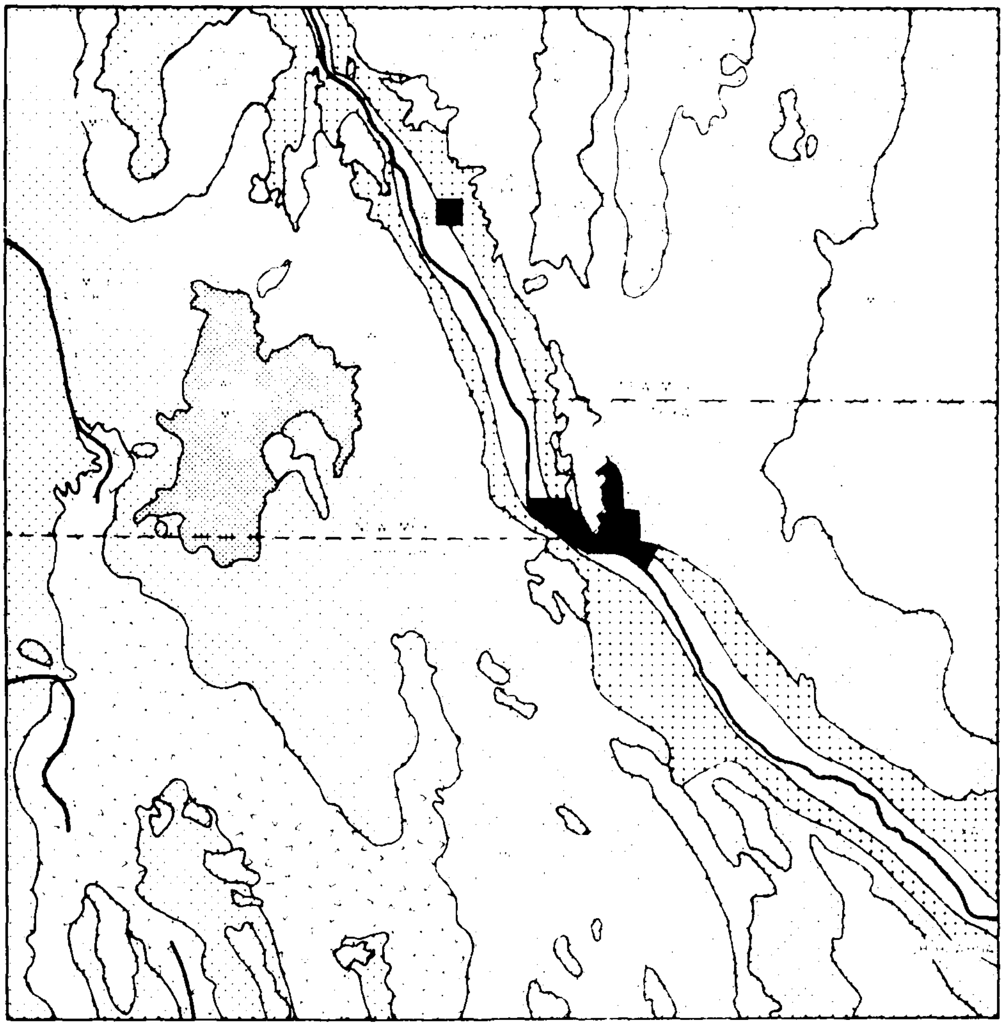


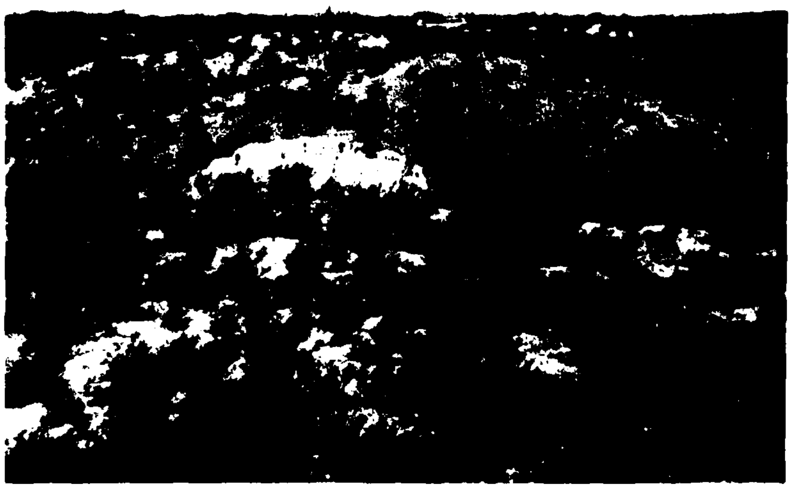
Figure 5. General Site Views.

a. View to the west-southwest across the site and the Rio Grande floodplain; La Mesa escarpment in background.

b. View to the west-northwest of the terrace containing the site and the dendritic arroyo east of the site.

Figure 5

a



b

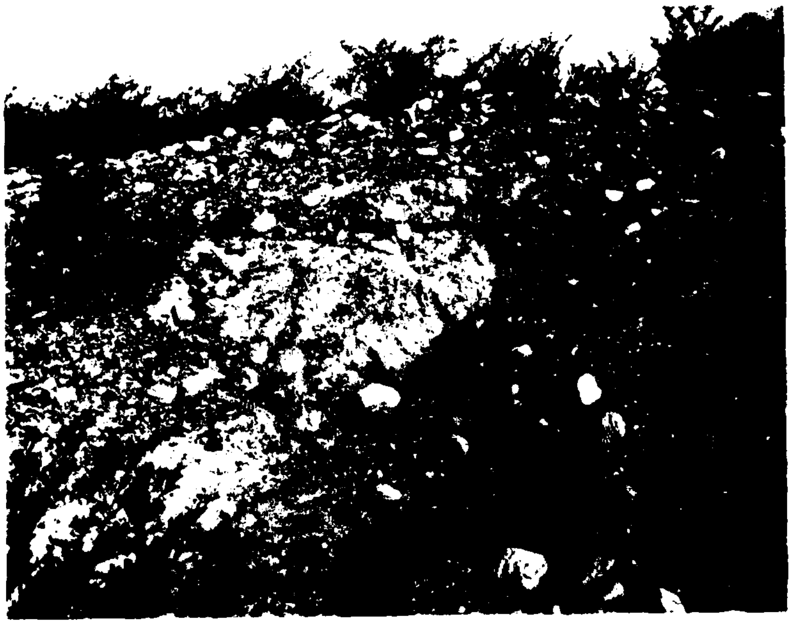
Figure 6. General Site Views.

a. View to the east across the south end of the site toward the Franklin Mountains; note gravel pavement on site periphery.

b. View of cobbles outcropping on the terrace edge around the site; largest cobbles are 25-30 cm in diameter.

Figure 6

a



b

Stratum 5 consists of cross-bedded sands on the surface of the site. These were noted mostly as recent accumulations around creosotebushes and yuccas.

The most archeologically relevant facts presented in this section are: (1) Site 32 rests on an alluvial terrace containing abundant lithic raw materials; (2) the site area is unusual in that it has an appreciable accumulation of eolian sands which probably made this a favored occupational locale; (3) the cultural materials are within a homogeneous deposit and can seldom be correlated stratigraphically; (4) these eolian sands are very loose and are not conducive to the preservation of contextual information or of organic materials; and (5) while the deposit containing the cultural materials reflects a net accumulation of soil, it is impossible to isolate discrete depositional and erosional episodes, and thus to detail precisely the effects of these processes on the archeological remains.

Climate

The modern climate of the El Paso area can be characterized as having a low total annual precipitation, high evaporation rate, high daytime summer temperatures, low night-time winter temperatures, a large diurnal temperature range, and low relative humidity (U.S. Department of Commerce 1969:33). The average annual rainfall is 20.0 cm (7.89 in) with most rain coming in the form of thunderstorms in July through September. The mean monthly rainfall total ranges from 0.7 cm (0.29 in) to 3.3 cm (1.29 in). Recorded annual rainfall extremes are 3.6 cm (1.4 in) in 1957 and 46.5 cm (18.3 in) in 1884 (Pigott 1977: 105). The average yearly relative humidity is 52 percent in the early mornings and 27 percent in the late afternoons. The mean annual temperature is 17.4° C (63.3° F) with the average daily maximum being 25.1° C (77.2° F) (range = 13.5° C [56.3° F] to 35.2° C [95.4° F]) and the average daily minimum being 9.7° C (49.4° F) (range = -1.4° C [29.5° F] to 20.5° C [68.9° F]). The highest and lowest recorded temperatures are 42.8° C (109° F) in June and July of 1960 and -22.2° C (-8° F) in January of 1962. The average number of frost-free days each year is 243. The prevailing winds in the area are from the north (October through February), west-southwest (March through May), and south (June through September). The spring winds have the greatest average velocities.

Evidence of paleoclimatic conditions in the project area comes from a number of sources, including studies of plant remains in woodrat nests (Van Devender 1977; Van Devender and Everitt 1977; Van Devender and Wiseman 1977; Van Devender and Riskind 1979; Van Devender and Spaulding 1979), pollen (Johnson 1963; Martin 1963; Mehringer et al. 1967; Freeman 1972; Bryant and Shafer 1977; O'Laughlin 1980), the geomorphological record (Antevs 1948, 1955; Haynes 1968; O'Laughlin 1980), and paleofauna (Van Devender and Worthington 1977). This wide variety of studies has not, however, yielded a consistent picture of how the climate of the area has changed over the last 10,000 years.

While there is general agreement that the late Wisconsin and early Holocene (prior to about 8000 years B.P.) were marked by cooler temperatures and greater precipitation than at present, and that the uplands supported pinyon-juniper and juniper-oak woodlands during these times, there is some disagreement over subsequent changes that have taken place. Antevs (1948, 1955) and Haynes (1968), among others, have argued that the middle Holocene (up to ca. 4500 years B.P.) was hot and dry (the Altithermal) and that the subsequent Medithermal (ca. 4500 years B.P. to present) was cooler and moister with a climate approximating that of today.

KEYSTONE DAM PROJECT

SITE 32

SCHEMATIC STRATIGRAPHIC CROSS SECTION

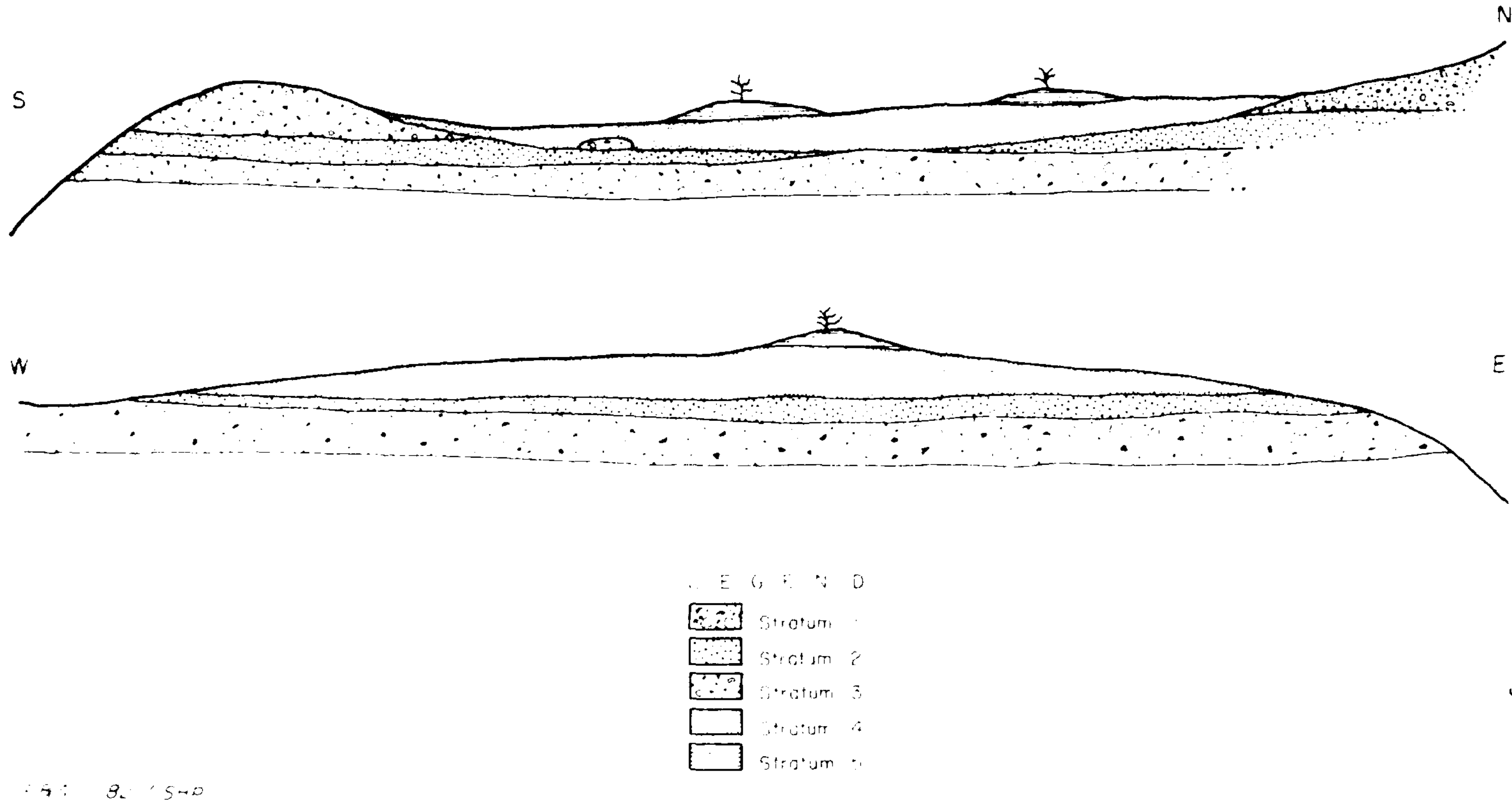


Figure 7

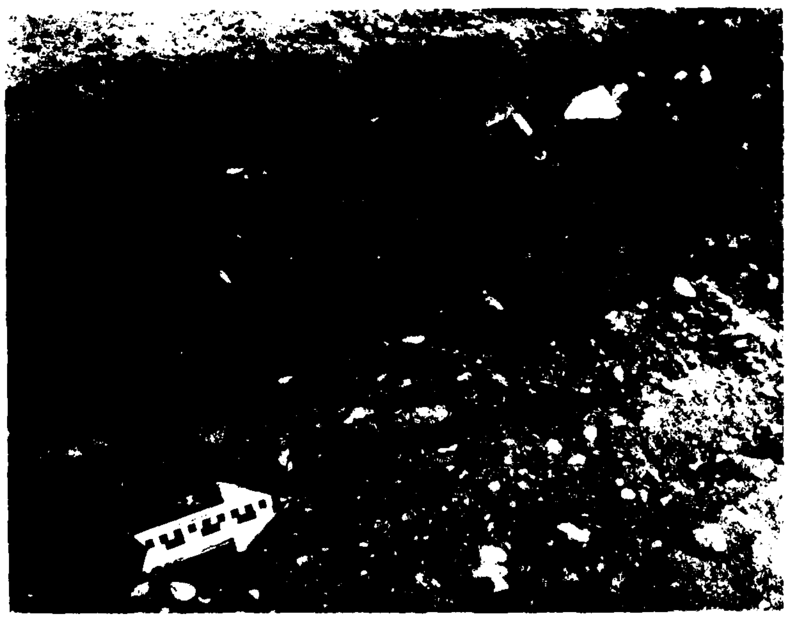
Figure 8. Site Stratigraphy.

a. View to the west of alluvial gravels (Stratum 1) underlying eolian sands in Backhoe Trench F.

b. View of alluvial gravels (Stratum 1) underlying eolian sands in Unit 1; note fire-cracked rocks in upper part of profile.

Figure 8

a



b

Van Devender's studies (see references above) of ancient woodrat nests suggest, on the other hand, that the middle and late Holocene (ca. 8000 years B.P. to present) was marked by an essentially modern climate with a trend toward increasing aridity. This evidence further indicates that the middle Holocene saw the development of a grassland over much of the area and that the drying trend resulted in the establishment of relatively more xerophytic species.

O'Laughlin's (1980) limited palynological and geomorphological evidence from Sites 33 and 34 tends to support Van Devender's reconstruction. The Site 32 palynological data are not helpful in paleoclimatic reconstruction, but the geomorphologic evidence does hint at drier conditions starting at 4900-6500 years ago. Thus, it appears that throughout the occupation of Site 32, the climate of the area was generally the same as it is today. It should be remembered, however, that this is a general reconstruction which does not account for small-scale variation, and that it is impossible to describe the climate at any given time in the occupation of Site 32.

Hydrology

Probably one of the main reasons that Site 32 was favored for occupation over a long period of time was its proximity to the only permanent, reliable water source in the area -- the Rio Grande. Prior to the construction of Elephant Butte Dam upstream from El Paso, the river's flow showed a great deal of seasonal variability with maximum discharge (and flooding) occurring in the spring. It was during this time of year that the Rio Grande was most active in terms of lateral migration across the valley. During the summer of some years, the river reportedly dried up completely (O'Laughlin 1980:12).

Although in prehistoric times playas were important sources of water east of the Franklins (Whalen 1981a) and may have been important on the La Mesa Surface west of the Mesilla Valley (O'Laughlin 1980:29), the only water source other than the river in the immediate project area is short-lived runoff in the arroyos which drain the eastern part of the valley and empty directly onto the Rio Grande floodplain. The monsoonal nature of the storms which deliver the rainfall and the coarseness of the sediments in this part of the valley prevent the runoff from accumulating for any appreciable length of time and thus render it an unreliable source of water.

Studies of ground-water resources in the Mesilla Bolson near Las Cruces, New Mexico have shown that the modern water table lies between 18 m (60 ft) and 171 m (560 below the present land surface over all of the bolson except the Rio Grande floodplain (Gile et al. 1981:Fig. 9). With the exception of some springs in the mountains, shallow ground water could have been important prehistorically only on the floodplain itself (Gile et al. 1981:51).

Vegetation

The project area lies within Blair's (1950) Chihuahuan biotic province. Present-day vegetation on Site 32 consists mainly of creosotebush (Larrea tridentata) with some ocotillo (Fouquieria splendens), soap-tree yucca (Yucca elata) and mesquite (Prosopis

glandulosa). O'Laughlin (1980:17) reports that [illegible] of the lower bajada environmental zone (Site 32 is in this vegetation zone) [illegible] support, in addition to the plants listed above, range ratany (Krameria parvifolia), [illegible] (Dalea [illegible]), three-awn (Aristida sp.), fluffgrass (Tridens pulchellus), [illegible] (Muhlenbergia porteri), sand dropseed (Sporobolus cryptandrus) and [illegible] (Bouteloua [illegible]) and that arroyo vegetation in this zone may include desert willow ([illegible] linearis), small-leafed sumac (Rhus microphylla), apache plume (Fallugia [illegible]), [illegible] (Brickellia laciniata), mesquite, whitethorn (Acacia constricta), [illegible] (Atriplex canescens), mariola (Parthenium incanum), and [illegible].

It is generally agreed (Gardner [illegible]; [illegible] 1965; York and Dick-Peddie 1969; Fenmotsu 1977; O'Laughlin [illegible]) that the present-day vegetation of the El Paso area has been modified substantially over the last century by livestock grazing and perhaps drought. The overall result has been the expansion of primarily creosotebush and mesquite at the expense of grasses. Thus, it is likely that, at least in late prehistoric times, the project area was a desert grassland rather than the desert shrub area as it is today.

Other historic vegetation changes in the area [illegible] have occurred as a result of human population pressures. The most notable of these are the [illegible] removal of the larger trees, especially junipers (Juniperus monosperma) and oak (Quercus sp.), from the Franklin Mountains and the severe alteration of the Rio Grande floodplain vegetation by cultivation, residential development, and water control activities (Campbell and Dick-Peddie 1964; O'Laughlin 1980:16).

Noting these recent changes in vegetation, O'Laughlin (1980:14-20) delineates six modern environmental zones, defined mostly by the distributions of botanical species, for the general project area. This effort, which is intended to aid in the understanding of prehistoric subsistence and settlement systems, explicitly assumes that the modern vegetation is similar to that of the last [illegible] years. This assumption is based on the climatological data discussed earlier which suggest that: (1) an essentially modern climate has existed in the area since the early part of the middle Holocene; and (2) the establishment of xerophytic species accompanied the middle to late Holocene drying trend (O'Laughlin 1980:14).

The following summary of O'Laughlin's discussion of environmental zones in the general project area is intended to identify some of the plants which may have been important as food and their probable distributions. This is not a complete listing of utilized species. The ethnographic data on aboriginal plant use for this part of the southwestern United States is summarized in Bohrer [illegible], Fenmotsu (1977) and Smith (1977). In this discussion, O'Laughlin's terminology (i.e., environmental zones) is used, although it should be realized that these zones are defined mostly on the basis of plant distributions and topography, and that these zones are not intended to represent ecological communities (O'Laughlin 1980:14). Figure [illegible] shows that these zones are roughly linear and trend north-south. The zones are described from east to west.

The mountain zone is restricted to those parts of the Franklin Mountains higher than about 1460 m (ca. 4800 ft) above mean sea level. These areas have steep slopes of mostly exposed bedrock and have few large canyons. Common xerophytic species include lechuguilla (Agave lecheguilla), prickly pear cactus (Opuntia spp.), ocotillo, sotol (Dasylirion wheeleri) and creosotebush; species such as wait-a-minute (Mimosa biuncifera), mesquite,

desert willow, whitethorn, small-leafed sumac, hackberry (Celtis reticulata), algerita (Berberis trifoliata), beargrass (Nolina texana), and some oak and juniper can be found at higher elevations or in protected canyons. The most important plant food resources of this zone probably were acorns, mesquite flowers and beans, sotol stalks and crowns, the fruits of datil (Yucca bacatta and Y. torreyi), the crowns of lechuguilla, the fruits and pads of prickly pear, and perhaps grass seeds (Bouteloua spp., Muhlenbergia spp., Panicum spp. and Sporobolus spp.). O'Laughlin (1980:16, 17) notes that only one of these, acorns, occurs exclusively in this zone and suggests that plant procurement in the mountains may have occurred mainly in the spring (sotol and lechuguilla crowns and datil fruits) and late summer or fall (prickly pear and perhaps mesquite).

The upper bajada zone includes those parts of the Franklin Mountain foothills with moderate slopes and gravelly soils. Prehistorically, the vegetation may have been comprised of grass and mixed desert shrub/succulent components with creosotebush, lechuguilla, ocotillo, prickly pear, datil and sotol on ridgetops, and wait-a-minute, mesquite, desert willow, whitethorn, small-leafed sumac, apache plume, and brickellbush in drainages. Potentially important food plants in this zone are the same as those found in the mountains, but sotol, datil and prickly pear generally occur in less abundance than at higher elevations.

The lower bajada zone occurs on gently sloping colluvial and alluvial deposits between the Rio Grande floodplain and the Franklin Mountains foothills. This zone, in which Site 32 is located, generally has less-rocky soils than the upper bajada zone. Species typically found in this zone are listed at the beginning of this section. O'Laughlin (1980:17-18) suggests that the number and density of potential food plants was relatively low and that soap-tree yucca (flowers, stalks, crowns and trunks) may have been the most important. Whitethorn and mesquite pods, datil and prickly pear fruits, and perhaps grass seeds could have been gathered on a small scale, probably mostly in the spring, summer and fall.

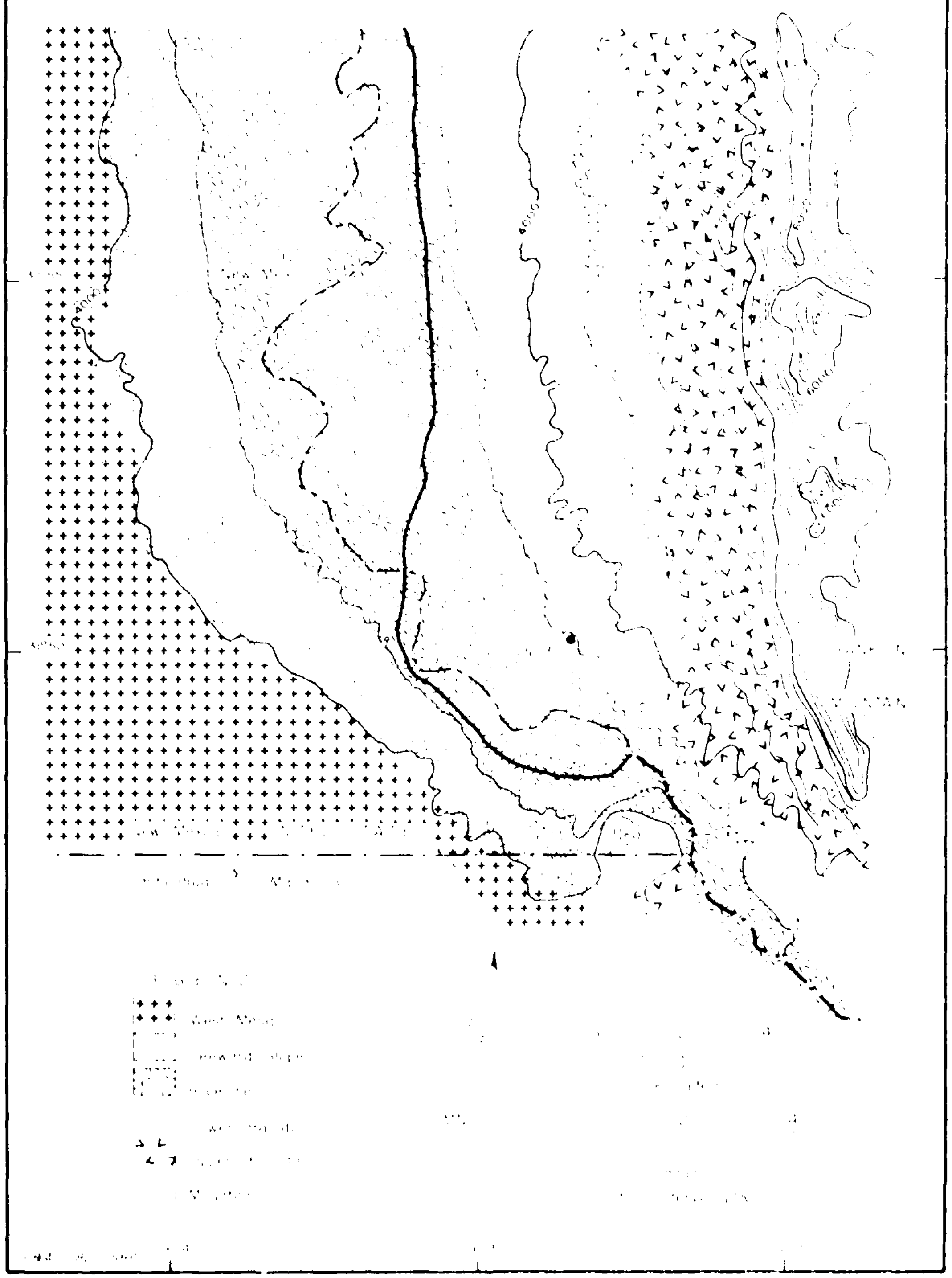
The riverine zone includes the lowlands on and adjacent to the modern Rio Grande floodplain. Prehistorically, this zone may have been bordered with stands of shrubs and small trees, such as wolfberry (Lycium pallidum), seepweed (Suada suffrutescens) and four-wing saltbush, and with stands of tornillo (Prosopis pubescens) and mesquite. The floodplain itself probably was relatively open with some saltgrass (Distichlis stricta), cottonwoods (Populus fremontii), willows (Salix gooddingii and S. exigua), seep-willows (Baccharis glutinosa), cattails (Typha latifolia), and reeds (Phragmites communis). The most important food plants may have been cattail (shoots, stalks, flowers, pollen and roots), tornillo (pods), mesquite (pods) and wolfberry (fruits). Of these, cattails could have been harvested throughout the year, wolfberries would have been available in the late spring or early summer, and tornillo and mesquite beans could have been harvested in the fall. Herbaceous plants such as goosefoot (Chenopodium spp.), amaranth (Amaranthus spp.), purslane (Portulaca oleracea) and dock (Rumex sp.) also may have been available in this zone.

The leeward slope zone occupies the dissected slopes west of the lowlands and east of the La Mesa surface. Eolian sands predominate here, and duning is common. These sandy areas have mesquite, soap-tree yucca, fourwing saltbush, broom dalea and joint fir (Ephedra trifurca), while creosotebush and broom snakeweed (Xanthocephalum sarothrae) can be found in areas with gravelly soil. Mesquite and soap-tree yucca are relatively abundant in this zone and were probably the main food plants.

Figure 9

KEYSTONE DAM PROJECT

ENVIRONMENTAL ZONES



The west mesa zone occupies the nearly flat La Mesa Surface which extends from the valley margin westward. Soils are generally sandy, and duning is common today. Some shallow depressed areas do occur, and these may have served as playas in wet weather. Common vegetation includes soap-tree yucca, mesquite and fourwing saltbush. Of these, soap-tree yucca and mesquite would have been potential food sources. Some herbaceous species, including amaranth, purslane and plains sunflower (Helianthus petriolaris), may also have been found in better-watered areas.

Table 1 summarizes data on the probable major plant food resources of the El Paso area. This information comes from Harrington (1972), Kirk (1975), Elmore (1976), Fenmetsu (1977) and O'Laughlin (1980). This obviously is not a complete listing of all food plants but includes only those which are presumed to have been most important. While the final section of this chapter deals in greater detail with the distribution of resources horizontally across the project area and seasonally throughout the year, a glance at Table 1 quickly reveals that: (1) plant foods are most abundant at higher elevations east of Site 32, on the floodplain west of the site, and on the La Mesa Surface and adjacent slopes west of the Rio Grande; (2) spring, summer and fall seem to be when these resources are most abundant, but some major foods are available in the winter as well; and (3) most of these resources can be dried and stored, either just as they are collected (e.g., mesquite and tornillo pods, cattail pollen and many of the fruits) or as cakes (e.g., the processed leaf bases and hearts of the leaf succulents).

Fauna

Animal species common in the Chihuahuan Desert are listed in Blair (1950) and Davis (1974). Those that were probably of greatest economic importance prehistorically are mule deer (Odocoileus hemionus), pronghorn (Antilocapra americana), desert cottontail (Sylvilagus auduboni), black-tailed jackrabbit (Lepus californicus), various fishes and perhaps migratory waterfowl.

O'Laughlin (1977b, 1980) has argued, based on the scarcity of faunal remains in sites near the project area, that hunting did not play a very large role in the subsistence systems of prehistoric people in the El Paso area. However, he further describes three general hunting patterns -- highland, lowland and riverine -- that may have been employed in the project area. These patterns are based on variability in the abundance of different species in different topographic and vegetation zones. It is emphasized, however, that particular species are not always restricted to a single environmental zone (except aquatic species), and that these suggested patterns are thus quite generalized.

The highland pattern involves the hunting of deer and cottontails in the mountains near the project area. It is suggested that deer could have been most easily hunted during the winter when they form herds and that cottontails could have been hunted throughout the year. Evidence from Fresnal Shelter (Human Systems Research 1972, 1973; Wimberly and Eidenbach 1981) in the Tularosa Basin north of the project area suggests that deer were commonly processed at camps in the mountains and that only the meat and skeletal elements with large amounts of meat were transported for consumption elsewhere.

The lowland pattern involves the hunting of jackrabbit, cottontail and pronghorn on the bajada between the Franklins and the Rio Grande and on elevated areas west of the

TABLE 1

MAJOR PLANT FOOD RESOURCES

Common Name	Plant Parts Eaten	Seasons of Availability	Method of Cooking	Environmental Zones with with Greatest Abundance
Soap-tree yucca	flowers	Summer	raw, boiled	lower bajada, leeward slope, west mesa
	flower stalks	Spring	boiled, roasted	
	leaf bases, hearts	year-round, best in Spring	pit-baked (can be dried)	
	trunks	year-round, best in Spring	pit-baked (can be dried)	
Lechuguilla	fruits, flowers	Summer, Fall	raw, boiled (can be dried)	mountain, upper bajada
	flower stalks	Spring	roasted	
	leaf bases, hearts	year-round, best in Spring	pit-baked (can be dried)	
Sotol	flowers	Summer	raw, boiled	mountain, upper bajada
	flower stalks	Spring	roasted	
	leaf bases, hearts	year-round, best in Spring	pit-baked (can be dried)	
Datil	fruits, flowers	Spring, Summer, Fall	raw, boiled (can be dried)	mountain, upper bajada
	flower stalks	Spring	boiled, roasted	
Prickly pear	fruits	late Summer, Fall	raw, boiled (can be dried)	mountain, upper bajada
	pads	year-round	raw, boiled, roasted	
Mesquite	pods	Fall	raw, boiled, used as flour	riverine, leeward slope, west mesa
Tornillo	pods	Fall	raw, boiled, used as flour	riverine
Wolfberry	fruits	Spring, early Summer	raw, boiled (can be dried)	riverine
Cattail	young shoots	Spring	raw, boiled	riverine
	flower stalks	Summer	raw, boiled, roasted	
	flowers	Summer	raw, boiled, roasted (can be dried)	
	pollen	late Summer	used as flour	
	seeds	late Summer, Fall	raw, roasted, used as flour (can be dried)	
	rootstocks	year-round, best in Fall	raw, boiled, baked (can be dried)	

floodplain. This pattern has been documented in the archeological record through investigations at the Sandy Bone Site in the leeward slope environmental zone (O'Laughlin 1977b). These species could have been pursued any time during the year.

The riverine pattern involves the hunting of cottontail, jackrabbit, spiny soft-shell turtle, various fish and migratory waterfowl, and perhaps muskrat and beaver along the Rio Grande and on the floodplain and floodplain borders. Cottontails may have been more important than jackrabbits because of the dense vegetation which probably bordered the floodplain. The aquatic species may have been available mostly during the summer, fall and winter when the river's flow was reduced. Migratory waterfowl would have been found most often in the fall, winter and spring.

In sum, it has been suggested that hunting was of secondary importance in the subsistence patterns of prehistoric people in the project area, that cottontails and jackrabbits would have been available year-round in a variety of environmental zones, that deer would have been most easily hunted in the Franklins during the winter, and that fish could have been taken from the Rio Grande at any time but the spring. While this discussion has focused on identifying the animals that may have been most often used for food, there has been no attempt to define the relative importance of different species. This is due largely to the fact that faunal remains are poorly preserved in the sandy soils of archeological sites in the El Paso area, and thus there is very little direct evidence on faunal resource utilization.

Summary and Discussion

Site 32 lies within mid to late Holocene eolian sands on a late Pleistocene alluvial terrace overlooking the Rio Grande floodplain. The alluvial deposits contain numerous cobbles of limestone, rhyolite, metaquartzite and chert, and were exploited as a source for lithic raw materials, both for tool manufacture and for hearth materials. The relatively extensive and thick mantle of eolian sands, which had accumulated in a shallow swale cut into the terrace surface, apparently made Site 32 a favored occupational locale.

The nature of the site soils has adversely affected the data recovered in these investigations in two main ways. First, the eolian deposits are extremely homogeneous, and thus it is impossible to use stratigraphy to correlate cultural deposits. Second, the coarseness of the sediments resulted in very poor preservation of pollen, faunal and macroscopic botanical remains, and organic artifacts. Also, the looseness of the sands, coupled with the high degree of animal disturbance, is not conducive to the preservation of contextual information.

Soils of the Mesilla Bolson, except for those of the Rio Grande valley itself generally, are coarse textured, have moderate permeability, and have a low water retention capacity (Jaco 1971). Floodplain soils are generally finer textured and are currently the only soils used for agriculture. It has been suggested (O'Laughlin 1980:10-11) that while some small-scale farming, using dry-land, rainfall and runoff techniques, could have been practiced on the larger alluvial fans bordering the floodplain and on the slopes east of the La Mesa Surface, the areas of primary agricultural potential in prehistoric times would have been the Rio Grande floodplain where dry-land and floodwater techniques could have been used.

Soils are not the only factor limiting agricultural productivity in the project area. The modern climate of the El Paso region is characterized as having little rainfall, low relative humidity, high evaporation rate, high daytime summer temperatures and low night-time winter temperatures. Because of the low precipitation and high evaporation, almost all farming today is done with irrigation.

Although considerable research has been done on paleoclimatological and vegetation changes in the El Paso area, there remains some debate in the interpretation of the evidence. Most of the data suggest, however, that the middle and late Holocene (ca. 8000 years B.P. to present) had a climate approximating that of today. Further, it appears that the middle Holocene saw the establishment of a desert grassland which subsequently competed with desert shrubs and xerophytic upland species. This gradual trend was radically accelerated in historic times when overgrazing almost completely removed grasses over many parts of southern New Mexico and West Texas.

While the palynological and macrobotanical analyses for Site 32 have not yielded information pertinent to understanding climatic changes, the geomorphic evidence suggests that the mid to late Holocene drying trend may have reached a critical point at 4900-6500 years B.P. This conclusion is based on the assumption that eolian deposition at Site 32 began as a result of increasing aridity and reduction of ground cover. The estimated date is based on the radiocarbon assays for Features 27 and 32 and assumes a constant soil accumulation rate prior to the use of Feature 32 (Table 2).

As reconstructed here, the subsistence system of preagricultural peoples in the Mesilla Bolson entailed a heavy reliance on leaf succulents (soap-tree yucca, lechuguilla, sotol, datil and prickly pear), mesquite and tornillo pods, wolfberries, and cattails, with relatively minor contributions by grass seeds, acorns, whitethorn beans, the greens and seeds of some herbaceous plants, deer, cottontails, jackrabbits, fish and migratory waterfowl.

Many of these resources, especially the plants, are most abundant at higher elevations east of Site 32 and to the west of the site on the floodplain, the La Mesa surface, and the slopes adjacent to the La Mesa Surface. Thus, the site is not located in a particularly productive part of the bolson in terms of food resources. Site 32 is, however, within 6 km of all the resource zones defined for the area, and there is no reason to believe that any of the zones could not have been exploited on a daily foraging basis (e.g., Lee 1979:175; Silberbauer 1981:265-269).

While most of these resources would have been most abundant or in their best condition for utilization during the spring, summer and fall, many would have been also available during the winter. Further, many could have been easily stored for use during the winter using a simple storage technology. Thus, there is insufficient evidence to infer that prehistoric human occupation of the Mesilla Bolson was tied to particular seasons of the year.

O'Laughlin (1980:20), in reviewing information on probable subsistence systems, concludes that the storage of foodstuffs for winter consumption may have led to reduced mobility during this time of the year and that winter residences would thus represent longer occupations involving a wider range of activities than would other sites. While there is some logic to this argument, there are several bothersome points about it. First, many of the presumed food sources would have been available, if not in prime

TABLE 2

DATA FOR ESTIMATING CALENDAR DATE FOR ONSET OF EOLIAN DEPOSITION

Thickness of eolian deposits between levels of origin for Features 27 and 32,
if prehistoric ground surface near these features followed modern slope = 20 cm
if prehistoric ground surface near these features was horizontal = 35 cm

Corrected* date for Feature 27 = 2160 B.C. ± 160
Corrected* date for Feature 32 = 650 B.C. ± 120
Minimum age difference = 1230 years
Maximum age difference = 1790 years

Minimum accumulation rate = 20 cm/1790 years = 11 cm/1000 years
Maximum accumulation rate = 35 cm/1230 years = 28 cm/1000 years

Thickness of eolian deposits below level of origin for Feature 27 = 25 cm

Minimum accumulation period prior to Feature 27 = 25 cm/28 cm per 1000 years = 893 years
Maximum accumulation period prior to Feature 27 = 25 cm/11 cm per 1000 years = 2273 years

Estimated calendar dates for onset of eolian deposition,
earliest = 2160 + 160 + 2273 = 4593 B.C. = 4600 B.C.
latest = 2160 - 160 + 893 = 2893 B.C. = 2900 B.C.

*These dates are C-13 and dendrochronologically (Damon et al. 1974) corrected.

condition, in the winter, and thus storage may not have been necessary. Second, it can be argued that decreased resource productivity in the winter may have led to increased mobility in the search for other food sources (e.g., hunting in the mountains). Third, it seems that a simple storage technology (e.g., storing dried fruits or yucca cakes) might not have necessitated a reduction of mobility. Fourth, it seems that storage for winter consumption would have been ongoing throughout the spring, summer and fall, and thus that the time of year with the greatest bulk of stored foodstuffs would have been late fall. In short, O'Laughlin's model is not entirely convincing. It is suggested here that this sort of model is too simplistic and assumes an excessive degree of regularity through time. Although Site 32 is interpreted here as representing repeated occupations involving broad ranges of activities (see Chapter XI), there is no direct evidence to suggest that these periodic reoccupations were restricted seasonally. It is emphasized that a precise reconstruction of settlement systems for the project area is dependent on gaining a better understanding of local subsistence systems, climatological and vegetational changes, and regional settlement and subsistence patterns.

CHAPTER II

ARCHEOLOGICAL BACKGROUND

This chapter has two main goals. The first is to provide a [illegible] framework for viewing the cultural history of the El Paso area. Adaptive strategies for each period are characterized in general terms using evidence from a broad geographical area. The second goal is to summarize previous archeological investigations in the immediate project vicinity to show the extent and intensity of work, research orientations, and general conclusions.

Summary of the Cultural History

The chronological framework employed here follows that commonly used in the area and consists of three periods -- Paleoindian, Archaic and Formative. Although these periods are used more as a system for temporal ordering than as parts of a developmental sequence, it is apparent that the prehistory of the project area involved changes in population density, subsistence patterns, settlement systems, and social organization. The following discussion deals only with that part of the temporal sequence up to the end of the Formative period (at about A.D. 1400) because, except for modern trash, there is no evidence that Site 32 was occupied or utilized in post-Formative prehistoric or historic times.

Before discussing the cultural history of the area, it is important to note that many of the dates given, especially for the earlier periods, are not well established. Indeed, setting up a well-defined chronology for the El Paso region has been and will continue to be a high research priority. Likewise, the prehistoric adaptive systems themselves remain poorly understood, for it is only in recent years that investigations in the area have been directed toward the study of these systems.

Paleoindian Period

This earliest period is represented in the El Paso area by certain distinctive artifacts, including Folsom projectile points and scrapers, recovered in surface collections (Beckes 1977; Everitt and Davis 1974; Quimby and Brook 19[illegible]; Brook 19[illegible]; Krone 19[illegible]; Davis 1975). No Paleoindian components have been investigated through excavation, and there are no absolute dates for this period in the project area.

However, based on data from the Plains and the Middle Rio Grande Valley (e.g., Judge 1973; Hester 1972; Wheat 1972; Wilmsen 1974; Sellards 19[illegible]; Johnson and Holliday 1980, 1981), the Paleoindian materials from the El Paso area are presumed to date to about 10,000 to 8,000 years ago and to represent relatively heavy reliance on the hunting of large mammals. Wild plant foods also undoubtedly contributed to the subsistence base (Sayles and Antevs 1941), although the relative importance of plant gathering remains unknown. It is assumed that Paleoindian social groups were small, fluid, and highly mobile (O'Laughlin 1980:23). The climatic shift which began in the early Holocene and resulted in an essentially modern environment by the middle Holocene apparently brought an

end to Paleoindian lifeways and sparked a set of adaptations which are seen as typifying the succeeding period, the Archaic.

Archaic Period

While the Archaic has been investigated through excavations in southeastern Arizona, southwestern New Mexico, and south-central New Mexico (e.g., Martin et al. 1952; Human Systems Research 1972; Wheat 1955; Sayles 1945; Dick 1965; Sayles and Antevs 1941; Martin and Rinaldo 1950; Haury 1936; Martin, Rinaldo and Antevs 1949), it was until recently known in the El Paso area only by surface finds of a wide variety of projectile point types. O'Laughlin's (1980) work at Sites 33 and 34, 500 m south of Site 32, is the first major investigation of an Archaic component in the area. The investigations reported here are the second.

This temporal division extends from the end of the Paleoindian period at about 8000 years ago to the beginning of the Formative period at about 2000 years ago. Radiocarbon dates from Archaic contexts at sites in the general project region, however, most consistently (n = 23) fall between about 3000 B.C. and 100 B.C. (Martin et al. 1952:8; Human Systems Research 1972:21; Whalen 1980:14; O'Laughlin 1979:20-21, 1980:48; Thompson and Beckett 1979:101). Earlier Archaic dates are scarce and come from relatively few sites (Dick 1965:17; Beckett 1973; Wimberly and Eidenbach 1981:23). It seems likely, then, that population densities in this part of the southwest were quite low during the early half of the Archaic and increased after about 3000 B.C.

The Archaic period in the southwestern United States is commonly characterized as involving a broad-spectrum hunting and gathering subsistence base, seasonal mobility, low population density, and small social group size. While this common view has been misused over the years (see Chapman 1980), it is regarded as a useful general model which seems to be supported, at least in a gross way, by the existing archeological data.

Investigations in the project area suggest that the primary subsistence activities may have been oriented toward gathering wild plant foods (especially leaf succulents, mesquite and tornillo beans, cattails, prickly pear fruits, acorns, and perhaps pinyon nuts and grass seeds) with hunting (mostly deer, antelope and rabbits) being of secondary importance (Beckes and Dibble 1977; O'Laughlin 1977a, 1980; Human Systems Research 1972; Bohrer 1981). Although agriculture is known to have been introduced into at least parts of the area during the Archaic (e.g., Dick 1965; Human Systems Research 1972), it is thought that its role in the subsistence system was limited. In terms of settlement patterns, data from the area suggest that not all sites were occupied with equal frequency and/or intensity (O'Laughlin 1979, 1980; Whalen 1977, 1978, 1980; Human Systems Research 1972; Greiser 1973; Beckes and Dibble 1977). Some appear to have been used on a short-term basis, perhaps for exploitation of a particular resource or set of resources; others seem to have supported more substantial occupations, either because they were used as base-camps or because they were favored campsite locales over a long period of time. The Archaic component at Keystone Dam Site 33 is interpreted as a base-camp which may have seen periodic reoccupation throughout the year, and may have been used as a relatively long-term residential locale during a part of the year (O'Laughlin 1980).

This summary of Archaic lifeways is admittedly vague and generalized. However, it is stressed that substantive data on Archaic adaptations in the El Paso area have been extremely scarce until recently. In fact, it is safe to say that the sites so far investigated as a result of the construction of the Keystone Dam add many times more information on the Archaic than previously existed. The task that is approached in this report and that will face other researchers in the future is to use this body of new data to eliminate the vagueness and generalities which pervade current views of Archaic cultural systems.

Formative Period

In comparison to preceding periods, the approximately 1400-year-long Formative period has been intensively investigated (e.g., Lehmer 1948; O'Laughlin 1977b, 1979, 1980; Whalen 1977, 1978, 1980; Thompson and Beckett 1979; Aten 1972; Beckes and Dibble 1977; Brook 1966a, 1966b, 1967, 1970; Green 1968a, 1968b; Kelley 1979; Lynn 1976; O'Laughlin and Greiser 1973; Way 1979; Wimberly and Rogers 1977; Marshall 1973). This is not to say, however, that the Formative in the El Paso area is completely understood since there are questions about chronology and changes in adaptive systems which remain unanswered.

First among these is the question of what really distinguishes the Formative from the Archaic. Although the original distinction was between two different *lifeways* -- *mobile* hunting and gathering versus sedentary or semisedentary farming and village life, it is now generally agreed that the only obvious difference is the addition of particular material goods, notably ceramics and the bow and arrow, to an otherwise Archaic artifact assemblage. In this respect, early Formative adaptations are seen as being very similar to those of the late Archaic.

In the original definition of the Jornada Branch of the Mogollon, Lehmer (1948) defined three time-sequential phases -- Mesilla, Dona Ana and El Paso. The Mesilla Phase was assigned dates of A.D. 900-1100 and was represented by pithouse villages and the appearance of undecorated brownware ceramics and arrow points. Mesilla Phase peoples were presumed to have been farmers who supplemented their subsistence with some hunting and wild plant gathering. The following Dona Ana Phase was ascribed dates of A.D. 1100-1200 and was represented by villages with both pithouses and pueblos and by both decorated and undecorated ceramics. This phase was seen as transitional between the earlier Mesilla Phase and the later El Paso Phase. The El Paso Phase was given dates of A.D. 1200-1400 and was distinguished by the presence of large pueblo villages and the predominance of decorated ceramics.

This original scheme is still in use today, although in slightly modified form. A substantial number of radiocarbon dates from sites east and west of the Franklins (O'Laughlin 1980; Whalen 1980, 1981b) show that ceramics first appeared in the area during the early centuries of the Christian Era, much earlier than Lehmer's A.D. 900 date. Thus, the beginning of the Mesilla Phase has been pushed back some 900 years. As noted, however, early Formative adaptations do not appear to have been substantially different from late Archaic ones, and early Mesilla Phase peoples are no longer considered to have been sedentary farmers.

Present evidence indicates that a number of changes in settlement patterns, subsistence practices, regional interaction, population density, and social group integration occurred during the Formative period (O'Laughlin 1980; Whalen 1977, 1978, 1980, 1981a; Beckes and Dibble 1977; Wimberly 1979; Carmichael 1981). The early Mesilla Phase is seen as closely resembling the Archaic with small, flexible social groups subsisting mostly on wild plant foods and faunal resources with some cultivation of plant foods. As in the Archaic, social groups may have been quite mobile, moving around perhaps seasonally in response to the availability of resources, and population density appears to have been low.

At the other extreme, El Paso Phase peoples lived in communities, probably had a relatively high degree of social integration, were farmers with a secondary reliance on hunting and collecting wild plants, and participated in considerable extraregional interaction. Population density was high during this time, and while nonresidential camps were used for the collection and/or processing of particular resources, the people were largely sedentary, living in pueblos situated near prime agricultural lands.

The transition between these two radically different lifeways appears to have been gradual, but O'Laughlin (1980:[illegible]) suggests that for the Mesilla Bolson noticeable changes occur in Mesilla Phase settlement and subsistence patterns during the period from A.D. [illegible] to [illegible]. These changes seem to have involved an increasing permanency of residence at certain sites located near potential agricultural lands and increasing occurrence of special-function sites used in the processing of leaf succulents.

While the gradual increases from early to late Formative in population density, reliance on agriculture, social integration, sedentarism, and regional interaction are fairly well documented, the causes of the changes are not completely understood. One must suspect, however, that it was a complex combination of factors rather than a single cause.

Likewise, the precise causes of the apparent abandonment of the El Paso area at about A.D. 1400 are not known. The most commonly used explanations focus on the occurrence of a prolonged drought at this time (Beckes and Dibble 1977:77) and an over-reliance on a subsistence base (agriculture) which was marginally suited to the environment of the region (O'Laughlin 1980:[illegible]).

Previous Archeological Investigations

Early archeological research in the El Paso area (e.g., Mera [illegible]; Cosgrove 1947; Alves [illegible], 1932; Ayer [illegible]; Howard [illegible]; Woolsey n.d.; Sayles [illegible]; Roberts 1929) was carried out generally in a casual manner, at least by today's standards, and concentrated largely on dry cave sites in the Hueco and Guadalupe mountains. These investigations contributed most significantly by showing that preceramic occupations did occur in the region and by giving some clues as to the kinds of perishable artifacts, including basketry, matting, sandals, atlatls, and cordage, which were used by prehistoric peoples. Most of the information gathered in these early investigations, however, is of little use in modern archeological studies because of the excavation techniques and methods of recording. Even though the original definitions of the preceramic complex, variously called the Hueco Phase, Hueco Cave Dweller, or Hueco Basketmaker, identified in these studies are no longer considered valid, the Hueco Phase continues to be used in discussing Archaic adaptations in the El Paso area (see Beckett [illegible]).

During the 1940s, 1950s and 1960s, sporadic investigations by professional archaeologists in southern New Mexico just north of the project area [illegible] period sites (e.g., Lehmer 1948; Hammack n.d.a., n.d.b.; [illegible]). Lehmer's work on sites near Las Cruces, New Mexico, during this period [illegible] definition of the Jornada Branch of the Mogollon and provided [illegible] Formative in this part of the Southwest. The other [illegible] usually not well reported, but they provide a valuable body of comparative data.

In contrast to southern New Mexico, investigations [illegible] were conducted almost exclusively (one important exception [illegible]) midden ring in El Paso County) by avocational archaeologists working through the El Paso Archaeological Society. From the late 1950s to the present day, this diligent group of people produced a number of reports dealing mostly with [illegible] Formative [illegible] sites in the area (e.g., Brook [illegible]; Brook 1967; Russell 1968; Bilbo 1972; [illegible]). These reports [illegible] information which otherwise would not be available.

By far the greatest amount of archaeological research [illegible] taken place in the 1970s and 1980s. Most of this work resulted from efforts by the U.S. Army to inventory resources on federal lands (Skelton et al. 1981, [illegible]; Kenmotsu 1977; Pigott 1977; Beckes [illegible]; Pigott and Dulaney 1977; [illegible]; Pigott 1977; Scott 1977; Whalen 1977, 1978, 1980) or from resource management in connection with the construction of flood control facilities in El Paso (Aten 1972; O'Laughlin and Greiser 1973; Gerald 1976; O'Laughlin [illegible]). [illegible] investigations near the project area in recent years include O'Laughlin's [illegible] excavations at the [illegible] Campus sites in northeast El Paso and at the Sandy Bone site [illegible] west of El Paso, Human Systems Research's ([illegible], 1973; [illegible] and Rogers 1977; [illegible] and Eidenbach 1981; Bohrer 1981) survey and excavation in the [illegible] Basin, and Thompson and Beckett's (1979) testing in northeast El Paso.

The following paragraphs describe those investigations [illegible] the prehistory, especially the Archaic and early Formative, of the immediate project area. The research considered includes excavations in northeast El Paso (Aten [illegible]; 1979; O'Laughlin and Greiser 1973; Thompson and Beckett [illegible]), survey and [illegible] Hueco Bolson (Whalen 1977, 1978, 1980), and excavation [illegible] west of the Franklin Mountains (O'Laughlin [illegible]).

The Northgate Site is a very large site, covering some [illegible], lying near the toe of a large alluvial fan on the east side of the Franklins. Investigations carried out here in the early 1970s in connection with the construction of the Northgate [illegible] (Aten 1972; O'Laughlin and Greiser 1973) involved extensive mapping, surface reconnaissance, surface collection, and backhoe trenching with limited controlled excavation. Ma[illegible]tures were found at the site, including literally hundreds of fire-cracked rock hea[illegible] at least one midden ring, one burial, and two shallow pit structures. One of the pit structures yielded radiocarbon dates of A.D. [illegible] ± 130 and A.D. [illegible] ± 70. Ceramics recovered in both investigations were predominantly El Paso Brown and suggested that the main occupation occurred in the early Formative Mesilla Phase. The presence of features below Mesilla Phase deposits indicates that an earlier, probably Archaic, component is also present, but it remains almost wholly unstudied. While Northgate yielded information which was at the time quite exciting, the investigations were too limited to be of much help in studying prehistoric cultural systems.

In the late 19[illegible]s, the El Paso Centennial Museum conducted surface reconnaissance, surface collection, augering, backhoe trenching, and limited controlled excavation of seven prehistoric sites on the Transmountain Campus of the El Paso Community College, just northwest of the Northgate Site (O'Laughlin 19[illegible]). Most of the 1[illegible] radiocarbon dates indicate Mesilla Phase occupations, but a light El Paso Phase occupation is also indicated by at least one of the dates, as well as the ceramics, and one hearth yielded Archaic period dates (43[illegible] B.C. ± 210 and 610 B.C. ± 180). In spite of the limited nature of these investigations, O'Laughlin was able to contribute significantly to an understanding of how these sites fit into prehistoric adaptive systems by employing a specific model against which data from these and other sites were tested.

Based largely on ". . . seasonal and spatial variability in the availability of natural resources and conditions appropriate for horticultural activities, small labor investment in storage facilities or housing, the finding of dwellings in both small and large sites, the wide and dispersed distribution of sites, and the apparent lack of dependence on horticulture . . ." (O'Laughlin 1979:[illegible]), he concludes that Mesilla Phase peoples were organized into small, flexible social groups who changed residences frequently. Through analyses of artifact and feature data recovered from the Transmountain sites, O'Laughlin further concludes that the most common activities occurring there involved the processing of plant foods, especially sotol and lechuguilla. Although some of O'Laughlin's methods and conclusions are of questionable validity, this effort remains extremely important because of the data gathered, the use of an explicit model, and the concise and clear statement of a major difference of opinion between O'Laughlin and the other primary researcher in the area, Michael Whalen. This difference, which arises from slightly different views of Mesilla Phase social organization, revolves around the use of site size and surface artifact density as indicators of permanency of occupation and social group size (O'Laughlin 1979:84-85). Whalen infers that larger sites with greater artifact densities were used as residential locales with smaller sites representing special function use. O'Laughlin, on the other hand, sees site size and artifact density as being a function of frequency of occupation rather than differences in site function. The result of this difference in view is that Whalen tends to emphasize variability in social group size and integration, as well as the importance of horticulture in nucleating settlement in the area during the Mesilla Phase, while O'Laughlin tends to emphasize the small and flexible nature of social groups, their high residential mobility and reliance on a wide variety of wild as well as cultivated plant foods.

In 19[illegible]8, the Cultural Resources Management Division of New Mexico State University conducted surface reconnaissance, mapping, surface collection, and very limited testing at five sites just south of the Northgate Site (Thompson and Beckett 197[illegible]). The ceramics recovered and two radiocarbon dates (A.D. 66[illegible] ± 7[illegible] and A.D. 940 ± 1[illegible]0) show that the major occupation occurred during the Mesilla Phase. A third radiocarbon date, 11[illegible]0 B.C. ± 1[illegible]0, on charcoal from an ash lens at one site indicates that an Archaic component was also present, but like the Archaic remains at the other nearby sites, this component remains essentially unstudied. While the report on these investigations is largely descriptive, Thompson and Beckett do suggest that the [illegible] hearths recorded on these sites and the artifacts collected represent multiple, short-term occupations geared toward the processing of wild plant foods.

The most ambitious investigation in the area started in 19[illegible] when the El Paso Centennial Museum, under contract with the U.S. Army Corps of Engineers, embarked on a program of survey, testing, and limited excavation which covered some 50[illegible] km² of the

Hueco Bolson between the Franklin and Hueco mountains, recorded over 300 sites, intensively studied 50 small campsites in one part of the bolson, and excavated parts of two Mesilla Phase residential sites (Whalen 1977, 1978, 1980). This research focused on trying to better define the chronology of the area and on studying changes in adaptive systems through time, especially within the Formative period. In terms of chronology, Whalen's main contributions lie in using radiocarbon dates to document late Archaic occupation in the Hueco Bolson and to show that ceramics were introduced into the area by at least A.D. 300 and possibly earlier (Whalen 1980, 1981b).

Whalen's research concentrated mostly, however, on using settlement pattern data to examine changes in adaptive systems between the Mesilla and El Paso phases. He observes (Whalen 1981a) that Mesilla Phase sites tend to be small and widely dispersed over the basin floor, where he states that the greatest variety and/or abundance of wild plant foods and animals would have been available and where limited farming could have been done, while El Paso Phase sites are larger and concentrated at the basin edges where rainfall runoff could have been used for relatively intensive agriculture. From these observed differences, he concludes that the late Formative period saw ". . . (1) an increase in area population, (2) the appearance of communities larger than ever before, (3) increasing reliance on plant cultivation, (4) increasing settlement system specialization, (5) increasing residential unit size, and (6) increasingly elaborate group ceremonial acitivites which functioned as social integrating mechanism" (Whalen 1981a:86). He further suggests that changes occurred gradually throughout the Mesilla Phase but that at about A.D. 1100 they accelerated radically to result in the classic Puebloan manifestation in the area, the El Paso Phase (Whalen 1981a:88).

While Whalen's overall conclusions are supported overwhelmingly by the data, his view, as noted earlier, of some of the details of Mesilla Phase adaptive systems has been questioned (O'Laughlin 1979; Carmichael 1981). Specifically, O'Laughlin and Carmichael point out that, for the Hueco Bolson, increased site size in the late Mesilla Phase may be the result of frequent reoccupation of certain favored locales rather than an increase in population and reliance on agriculture as Whalen suggests. Neither view can be demonstrated to be more correct than the other with the data available, and for now both are considered as possibilities.

Both of the previous investigations west of the Franklin Mountains were conducted by the El Paso Centennial Museum. The first (O'Laughlin 1977b) involved the excavation of a small part (32 m^2) of the Sandy Bone Site, located among sand dunes on the first terrace west of the Rio Grande, almost due west of Site 32. Ceramics recovered during the excavations indicate a Mesilla Phase occupation. The most important information from the Sandy Bone Site comes from the relatively abundant (compared to other open sites in the area) faunal remains recovered. O'Laughlin (1977b:19-20) found mostly jackrabbit and cottontail bones, but he also identified elements representing two species of toad, two species of turtle, quail, owl, kangaroo rat, woodrat, muskrat, and deer. O'Laughlin states that this ". . . *assemblage reflects* a low elevation hunting strategy oriented principally towards rabbits with some animals taken from the riverine habitat" (O'Laughlin 1977b:26). In this article, he uses archeological data from Sandy Bone and other sites in the region to outline a useful model of hunting strategies for prehistoric peoples in the El Paso area. In essence, this model proposes that: (1) deer and cottontails could have been hunted in the mountains; (2) jackrabbits, cottontails and antelope could have been taken on the bajada slope between the mountains and the river and in elevated areas west of the floodplain; and (3) cottontails, jackrabbits, spiny soft-shell turtles, fish, waterfowl, and muskrat would have been available in the Rio Grande or along its floodplain.

The second major investigation west of the Franklins is O'Laughlin's (1980) work at the Keystone Dam sites. As noted in Chapter I, eight sites, including Site 32, were subjected to surface reconnaissance. Two of these, Sites 33 and 34, received the most attention, however, and are discussed below.

Sites 33 and 34 are situated on an alluvial fan about 500 m south of Site 32. The two sites are contiguous and cover some 42,000 m^2. O'Laughlin's investigations here involved extensive surface collection and mapping, systematic soil augering, backhoe trenching, and limited controlled excavation (96 m^2).

The midpoints of the fifteen radiocarbon dates from these sites fall into two clusters, one between 2790 B.C. and 1590 B.C. (n = 5) and the other between 160 B.C. and A.D. 1500 (n = 10) (O'Laughlin 1980:48-49). Based on these dates, the stratigraphic evidence, and the ceramics recovered, O'Laughlin concludes that the primary occupations occurred during the late Archaic (suggested date range of 2500-1800 B.C.) and early Formative (suggested date range of A.D. 250-1100). A relatively light late Formative (El Paso Phase) component is also indicated.

It is particularly important that these sites are on an aggrading landform and are relatively well stratified. Although detailed geomorphologic studies of the alluvial fan containing the sites are lacking, it appears that the Archaic component is restricted to a geologic deposit distinct from that containing the Formative period materials. This situation is extremely uncommon in the El Paso area and provides an excellent opportunity to study changes in adaptive systems through time.

In these investigations, O'Laughlin found that Archaic period occupations left burned structures (12 were partly or wholly excavated; 11 others were found but not excavated) and relatively few fire-cracked rock hearths while Formative period occupations left numerous hearths but no structures. The Archaic structures are small (about 3 m in diameter), shallow (about 10 cm), basin-shaped depressions with unplastered circular floors and jacal suprastructures (O'Laughlin 1980:145).

Analyses of the Mesilla Phase features and artifacts suggest to O'Laughlin (1980:149) that the early Formative occupations were short term and oriented largely toward processing leaf succulents. Archaic features and artifacts are not as easily interpreted, however. That these occupations were permanent or semipermanent is suggested by: (1) the presence of structures and a relatively wide variety of other features, including trash and storage pits; (2) the fact that overlapping structures were not found; (3) the fact that most of the structures occur in clusters of two to five with possibly associated extramural features; (4) the occurrence in one structure of a variety of burned floral remains which would have been most available in the late spring through fall; and (5) the occurrence of ground and chipped stone artifacts which are suggestive of a wide variety of supportive and maintenance activities (O'Laughlin 1980:147-148).

On the other hand, that these occupations were short term and seasonal is suggested by: (1) the apparent flimsiness of the structures (i.e., there was not a great investment of energy in house construction); (2) the consistent burning of structures, perhaps at the end of each seasonal occupation; and (3) the possible occurrence of multiple floors separated by periods of disuse in three structures (O'Laughlin 1980:148). O'Laughlin further suggests that the site may have been used as a habitation during the winter, when wild plant foods in areas away from the Rio Grande would have been least abundant, and as a

base camp during the spring, summer, and fall months when groups may have frequently moved around in response to resource availability (O'Laughlin 1980:148-149). As discussed elsewhere in this report, the Site 32 investigations were designed to test this model of Archaic and early Formative adaptive systems in the El Paso area.

CHAPTER V

METHODOLOGY AND SCOPE OF INVESTIGATIONS

This chapter describes the tasks, methods and general results of each of the three phases of this project. In detailing the Phase II investigations, the tasks actually accomplished are compared to those presented in the Planning Document. This chapter closes with an evaluation of strategies and techniques.

Phase I

Phase I investigations involved approximately [illegible] person-days of effort and resulted in an explicit work plan for Phases II and III. The production of this [illegible] entailed: (1) an intensive review of all existing information [illegible] archeological literature for the El Paso area; and (2) [illegible] vide information on the horizontal and vertical extent of [illegible] Phase II fieldwork. The review of information about [illegible] presented by Gerald (1976) and O'Laughlin ([illegible]) and [illegible] in March 1982. The El Paso Centennial Museum has [illegible] that in the two publications listed above. The [illegible] number of reports on investigations in west Texas, [illegible] Mexico, but focused on well-reported [illegible] (O'Laughlin 1979, 1980; Whalen 1977, [illegible], 1980, [illegible]) [illegible] in constructing research questions for the Site [illegible].

On-site tasks accomplished during Phase I [illegible] a transit to establish two perpendicular [illegible] trols throughout the investigation [illegible] markers; (3) prepare [illegible] general site map; and (4) [illegible]. The first two tasks were carried out [illegible] part of the site, marking it with a [illegible] arbitrary grid designation of N[illegible] [illegible] was [illegible] above all [illegible] were then set with [illegible] lines. The [illegible] south [illegible] W14[illegible] and 4 m east [illegible] refer- ence data throughout [illegible] intervals along these two grid [illegible] magnetic north.

The site map made during Phase I [illegible] contour interval), site limits, [illegible]. This map was used as a base map throughout [illegible].

Phase I testing involved [illegible] site stratigraphy, depth of cultural deposits, [illegible] features. The [illegible]

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N99/W131, N100/W78, N106/W99, N120/W95, and N121/W95) were located so as to sample various parts of the site (i.e., the central portion and the eastern, southern and western peripheries), to investigate an apparent surface feature (Feature 1), and to examine areas with gray-stained soil on the surface. All seven were excavated, using shovels and trowels, in 20-cm-thick arbitrary levels until Pleistocene gravels were encountered. Matrix was sieved through 1/4-in mesh in four units, and 1/8-in mesh window screen in three units. All fire-cracked rocks and selected artifacts were plotted in place. Materials recovered were bagged and returned to Austin for washing, sorting and cataloging.

The Phase I field efforts were productive in a number of ways. In addition to accomplishing preliminary grid work and mapping, these investigations revealed that: (1) cultural materials were distributed vertically through as much as 80 cm of natural deposits but were most concentrated in the upper 40 cm; (2) subsurface cultural features were present; (3) features were likely to be distributed vertically over at least 30 cm; (4) artifact densities were variable but were quite high (up to 342 specimens/cubic m) in some parts of the site; (5) ceramics were probably limited to the surface and upper few centimeters of soil at the site, and thus the main occupation appeared to date to the Archaic period; (6) chipped and ground stone tools were present; and (7) some organic materials might be preserved in the site deposits. While these conclusions were generally positive and indicated that Site 32 had a high research potential, these investigations also confirmed that the site soils were homogeneous, coarse-grained, and poorly consolidated; consequently it was expected that preservation of both organic remains and contextual information would be poor.

The final three weeks of Phase I were spent preparing the Planning Document. The intent and contents of this document have been described previously and are not reiterated here. The Planning Document was submitted to the Corps on April 13, was subsequently amended (as requested by the Albuquerque District) and resubmitted on April 27, and was approved on April 30. The Phase II fieldwork started on May 3.

Phase II

Phase II entailed seven weeks of fieldwork and laboratory processing and required approximately [illegible] person days of effort. In addition to describing what was done and how it was done, this section compares the actual accomplishments with the tasks proposed in the Planning Document.

Field Investigations

The Planning Document outlined seven major on-site tasks for Phase II -- grid extension, mapping, surface collection, surface feature investigation, backhoe trench excavation, [illegible] sample excavation, and intensive excavation. For this discussion, the first two [illegible] are combined and an eighth, special sample collection, is added. Table 3 [illegible] each task (excluding special sample collection) [illegible] in the Planning Document.

TABLE 3

MAJOR PHASE II ON-SITE TASKS: COMPARISON OF LEVEL OF EFFORT ACTUALLY EXPENDED AND PLANNING DOCUMENT ESTIMATES

Task	Estimated Person-Days Required	Actual Person-Days Used*
Grid Extension and Mapping	15-18	9
Surface Collection	20-35	52
Surface Feature Investigation	25-50	60
Backhoe Trench Excavation	30-50	10
Sampling Excavations	60-90	15
Intensive Excavations	177-270	200

*These are approximate figures.

GRID EXTENSION AND MAPPING

Extending the grid to provide horizontal provenience controls for surface collection and excavation was accomplished in the first week of the fieldwork. This task involved using a transit and metric tape to set wooden or iron stakes at 8-m intervals off the north-south and east-west baselines established during Phase I. In this manner, the grid was extended over the 6032-m² central part of the site. Additional grid points were set with the transit, usually at 16-m intervals, around the site periphery to provide horizontal controls for the sampling surface collection. Grid stakes between the 8-m interval stakes were set as needed by measuring between transit-set stakes, although the transit was used in placing some of the gridlines through the two large block excavation units (Units 1 and 2).

As noted, a site map with 0.5-m contour intervals was made during the Phase I site visit. After the grid work was completed, the accuracy of this base map was evaluated by examining the location of topographic features shown on the map. The original map was found to be accurate. The only other small-scale mapping involved locating the site grid on a blueline copy of an orthophoto map (scale: 1 in = 100 ft; contour interval = 2 ft) of the Keystone Dam project area provided by the Corps of Engineers. This was done by locating grid points in relationship to individual shrubs visible on the map and extending the grid from these known points. This map provided the determination of the magnetic declination of the site grid, served as a base map for Figure 24, and was used to plot off-site special samples collection locales.

SURFACE COLLECTION

As originally planned, this task was to involve a 100 percent surface collection of the entire 12,600-m² area of the site and was to have been completed in the first week of fieldwork. During this first week, it became apparent that this task was going much more slowly than had been anticipated and that the main part of the site covered less than 6000 m² of the central portion of the terrace. Based on these observations, a modified surface collection strategy was proposed to the Corps and later approved. This strategy involved intensively surface collecting, as originally planned, the 6,032-m² central part of the site and collecting a systematic sample of surface artifacts from the site periphery. The sampling method used involved 22 4.5-m-diameter circles as collection units. These were spaced at 16-m intervals except where topographic features made other intervals more reasonable. Circles of 4.5-m diameter were chosen because they were easy to locate and demarcate (i.e., by tying a 2.25-m-long string around a grid stake at the center of the unit) and because each would encompass an area (16 m²) equal to that of the basic unit used in the intensive surface collection. Using this revised strategy, 100 percent of the main site area and 5.4 percent of the site periphery were surface collected. In all, 50.7 percent of the site was collected (see Fig. 3).

The basic collection unit in the central part of the site was a 4x4-m square (n = 356). Smaller units, 2x2-m squares (n = 68) and 2x4-m rectangles (n = 4), were employed around surface features. These fairly gross units were deemed appropriate because it was felt that surficial materials would be of low integrity and reflect cultural patterning only in a general way, and because the use of smaller units would have entailed a considerably greater expenditure of time.

Information recorded for each surface collection unit included number and weight of fractured rocks, amount of erosion or deflation, amount of recent disturbance, cultural features present, and kinds of artifacts collected. In addition, a sketch map for each unit showed areas covered by vegetation and/or recent sand dunes, erosional features, and noteworthy fire-cracked rock or artifact concentrations. Fire-cracked rocks were not quantified for the systematic sample units because the site periphery is deflated and is largely covered with a gravel pavement which makes the identification of fire-cracked rocks extremely difficult.

The general goal for this task was to gather information on the surface distribution of artifacts which could be used to delimit areas of relatively intensive occupation and to help guide the placement of excavation units. The strategy employed was successful in that the information collected allowed a confident demarcation of the main occupational area and an examination of variation in surface artifact densities within that area.

SURFACE FEATURE INVESTIGATION

The 11 possible cultural features identified on the surface were investigated in the first through fourth weeks of fieldwork. The fractured rocks and artifacts which compose each feature were mapped (total area mapped in detail = 186 m²), and each feature was partially or wholly excavated (Fig. 10). The excavations consisted of 0.5-m- or 1-m-wide trenches of varying lengths (see Fig. 3) located to provide a cross section of each feature (total area excavated = 20.75 m²). Trenches were excavated until they were obviously below the bottoms of features, usually 30 to 50 cm below ground surface. Excavation was

done in 10-cm-thick arbitrary levels with top and bottom elevations being even decimeters (e.g., 99.50-99.40 rather than 99.53-99.43). Shovels and trowels were used, and all excavated soil was screened through 1/4-in mesh hardware cloth. All fractured rocks [illegible] cm or larger in diameter and some artifacts were plotted in place. Techniques of collecting special samples from these features are described later in this chapter.

The main goals of this task were to determine what these concentrations of fractured rocks represented and whether or not their distribution reflected that of subsurface cultural remains. The cross section trenches were suited to these goals because they maximized the ability to see vertical relationships. In most cases, the trenches allowed a confident assessment of whether the features were disturbed hearths, intact hearths, or simply dispersed rock scatters. Some measure of interpretability was lost, however, because the trenches did not provide broad horizontal views. For example, more-extensive excavation of some of the large rock concentrations which are interpreted as representing deflated hearths or hearth clusters may have shown how many hearths had originally been present. Nonetheless, the decision was made in the field that the potential information yield from the surface features was low and that they thus did not merit more attention than was given.

BACKHOE TRENCH EXCAVATION

This task (Fig. 11) consisted of excavating and profiling 302 linear m of 1-m-wide backhoe trenches (BHT's). All trenches (see Fig. 3) were dug to or into the Pleistocene terrace deposits. BHT A through BHT G (260 m in length) were excavated in the second and third weeks of fieldwork; BHT H through BHT J (42 m long) were dug in the final week. Trench excavation was monitored to avoid the destruction of intact subsurface features. Profiles showing cultural remains, soil horizons and stratigraphic units were drawn of one wall of each trench. Eight of the ten letters used refer to nonadjoining trenches; BHT A and B are contiguous.

This task was intended to determine the depth and horizontal extent of the subsurface cultural materials and to provide information on the geomorphic history. The first seven trenches were dug to satisfy both goals and were placed so that they extended from the central portion of the site, where surface evidence and Phase 1 test pits suggested that the cultural remains were most concentrated and most deeply buried, out onto the site periphery where cultural remains were sparse. The last three trenches (BHT H-J) were dug to answer specific questions about the geomorphology of the terrace and were thus placed to sample particular topographic features.

This task accomplished its goals in that it provided sufficient data for a general reconstruction of the geomorphic history of the site area; it defined with some confidence the limits of the 3100-m² area containing surface fire-cracked rock (see Fig. [illegible]); and it located areas with intact subsurface features, high artifact densities, and gray-stained soil which could be further investigated with intensive excavations. Although it can be argued that more numerous and more closely spaced trenches would have provided a better chance of locating certain kinds of features, such as structures (e.g., O'Laughlin 1979), it was felt that backhoe trenching of that intensity was not warranted in view of the negative evidence for structures as seen in the initial trenching at the site.

Figure 10. Surface Feature Investigation.

a. View to the southwest of Feature 13 being mapped.

b. View to the south of Feature 9 being cross sectioned.

Figure 10

Figure 11. Backhoe Trench Excavation.

a. View of machine digging Backhoe Trench A.

b. View to the west of shovel-cleaning Backhoe Trench B.

Figure 11

a

SYSTEMATIC SAMPLE EXCAVATIONS

As originally proposed, this task was to involve the excavation of at least 25 2x2-m squares placed systematically over the entire site. On reassessing this task during Phase II, it was decided that a revised strategy could provide a more meaningful body of data and could be accomplished more quickly. The revised approach, which was approved by the Corps, proposed that smaller excavation units (1x1 m) be used to sample only that portion of the site with the potential for subsurface cultural remains (i.e., the area with eolian deposits) rather than the entire terrace surface. Thus, 25 sampling units were arranged in a staggered geometric design with 16-m east-west intervals over an area of 6300 m² (see Fig. 3). This provides a 0.4 percent sample of the part of the site with the potential for subsurface cultural remains. Two of the sampling units were within block excavation areas (Units 1 and 2).

Each 1x1-m sample unit was excavated with shovel and trowel down to the basal gravels in 10-cm-thick arbitrary levels. All matrix was screened through 1/4-in mesh hardware cloth. Fire-cracked rocks 5 cm or more in diameter were plotted in place and all fire-cracked rocks recovered were counted and weighed.

The primary goals for this task originally were to provide systematic excavation coverage of the site and to provide input into the placement of intensive excavation units. As it turned out, data gathered in sample excavations were not used in deciding where to intensively excavate; backhoe trenches and surface evidence provided sufficient information for these decisions. Sample excavation information is used as an adjunct to evidence from backhoe trenching in delimiting the extent of subsurface cultural remains, but its primary use is as a body of sample artifact data which can be viewed as representative of the site as a whole and which can be used in comparing Site 32 with other similarly sampled sites.

INTENSIVE BLOCK EXCAVATIONS

Three blocks of contiguous 1x1-m squares were excavated (see Fig. 3). Unit 1 (Fig. 12a) covers 95.5 m², including 1 m² excavated as a systematic sample unit. The depth of excavations below modern ground surface averaged 33 cm and ranged from 20 to 95 cm. Most of this unit was excavated just to the base of a continuous zone of dispersed fire-cracked rocks which occurred at 20-40 cm below the surface. The deeper squares in this unit show that fire-cracked rocks were sparse below the rock zone and that artifacts decreased in frequency. In addition to the continuous dispersed scatter of burned rocks, Unit 1 yielded two intact rock hearths, three discrete areas with gray-stained soil, one pit, and high lithic artifact densities. The Unit 1 area was chosen for intensive excavation because: (1) surface artifact densities were high in this part of the site; (2) apparently little-disturbed subsurface cultural remains had been found there during Phase I (in N74/W99); (3) intact subsurface cultural features (Features 17 and 18) were exposed in the west wall of BHT A in this area; and (4) the Phase I and surface artifact collections from this portion of the site lacked ceramics. The general excavation strategy involved connecting N74/W99 with Features 17 and 18 and then expanding to the north toward the central part of the site.

Unit 2 (Fig. 12b) covers 72 m², including 7 m² dug during Phase I or surface feature investigation and 1 m² excavated as a systematic sample unit. The depth of excavation

averaged 42 cm and ranged from 10 to 75 cm. Excavations were generally deeper here than in Unit 1 because the southern part of this unit had deeply buried cultural remains. Unit 2 yielded a dispersed fire-cracked rock scatter, five intact rock hearths, two highly disturbed rock hearths, and relatively low artifact densities. The Unit 2 area was chosen for intensive investigation because: (1) surface artifact densities were high; (2) a surface feature was found here; (3) an intact subsurface feature (Feature 5) had been found here during surface feature investigations; (4) subsurface features (Features 26, [illegible] and 28) were exposed in the east wall of BHT [illegible] in this part of the site; and (5) the Phase I and surface artifact collections from this area contained ceramics. The general excavation strategy involved opening 1x1-m units east of BHT [illegible] to expose Features [illegible] and [illegible] and to connect the Feature [illegible] area with the Feature 5 area.

Unit 3 covers [illegible] m² with an average depth of [illegible] cm (range [illegible] cm). This unit was excavated to the Pleistocene gravelly sands overlying basal gravels. Unit 3 yielded a dispersed fire-cracked rock scatter (Feature 16) and high lithic artifact densities. The Unit 3 area was chosen for intensive investigation, even though intact features were not known to exist there, because BHT 6 had exposed relatively dark [illegible] soil in this area. The intent was to excavate a large enough area to obtain a reliable sample of artifact and feature information.

Investigative methods used in all three block excavation areas were generally the same. The minimal horizontal provenience unit was the 1x1-m square except in some cases adjacent to backhoe trenches where larger or smaller units were more convenient. Excavation was done in 10-cm-thick arbitrary levels, with top and bottom elevations at even decimeters (e.g., 99.50-99.40 m), except for the uppermost level in some squares where the level thickness varied due to the slope of the ground surface. Shovels, trowels and brushes were used in these excavations, and all matrix was screened through 1/4-in mesh hardware cloth. Scattered fire-cracked rocks were counted and weighed for each minimal provenience unit. In some cases, these scattered rocks were also mapped; however, this usually was not done because of the low information potential of this kind of data and the great amount of time required to map all the rocks.

Information on each arbitrary level unit was recorded on printed level forms. Each of the crew chiefs in charge of the two main block excavations completed a daily journal in which the day's activities in each unit were recorded. A general daily journal for the site as a whole was also maintained. The excavations were documented with black-and-white (2-1/4-in format) and color [illegible] photographs showing the site setting, field methods, features, soil profiles and artifacts in place.

Most of the subsurface features [illegible] were [illegible] of more or less fractured rocks. These were investigated by fully exposing the rocks, recording their positions with detailed mapping and photography, and then sectioning the feature to look for pit margins beneath the rocks. [illegible] were quantified by weight and number. [illegible] samples were taken from most features. Nonrock features were [illegible] the feature limits horizontally and cutting one or more [illegible] relationships.

Figure 12. General Views of Units 1 and 2.

a. View to the west of Unit 1 during early stage of excavations.

b. View to the southwest of Unit 2 near end of fieldwork.

Figure 12

a

b

COLLECTION OF SPECIAL SAMPLES

Three kinds of special samples were collected during these investigations -- radiocarbon, flotation and pollen. Radiocarbon samples were collected whenever charcoal was encountered in the excavations. Most samples were from features, but some were from nonfeature deposits. Samples were collected using a clean trowel and placed in foil envelopes. The poor preservation of organic materials at Site 32 is demonstrated by the fact that only 13 radiocarbon samples were collected. Only three of these yielded dates. A fourth may have been datable, but was not submitted because it was a composite of four field samples collected from uncertain contexts near a surface feature. All of the remaining samples contained insufficient charcoal for dating.

Flotation sampling at Site 32 was intended primarily to provide information on feature contents and thus feature function. Of the 63 flotation samples collected, 28 are from features. Six of these are from three surface features with subsurface integrity (Features 8, 10 and 15); the remaining 22 are from 12 subsurface features. Two of the 22 sample a dispersed fractured rock scatter; the remainder sample intact features. The volume of fill collected from each feature depended on a variety of factors including amount of fill present and degree of preservation, but most feature samples had volumes of 2 to 6 l. Samples from rock hearths were most often taken from the fill around the rocks; samples from the larger nonrock features (Features 18 and 29) were taken from at least several arbitrary 10-cm levels within the features.

Recognizing that the ability to interpret feature samples depends on the ability to factor out naturally occurring macrobotanical remains, a sampling strategy was implemented involving numerous samples from off-site deposits and on-site nonfeature contexts. Twelve samples were taken from stratigraphic columns at four off-site sampling locations (A, B, C and D). Samples were taken from 10-cm-thick arbitrary levels. The off-site locations were 73 m south, 149 m north, 213 m southeast, and 213 m northwest of N100/W100. The 23 on-site nonfeature samples were taken from eight stratigraphic columns adjacent to backhoe trenches. These samples were taken from 20-cm-thick arbitrary levels. The eight sample columns (Columns A-H) have the following approximate grid coordinates -- N63/W83, N94/W94, N108/W99, N139/W95, N98/W131, N105/W109, N107/W86, N106/W70 -- and provide north-south and east-west transects through the site. The off-site and on-site nonfeature samples had volumes of about 4 l. All flotation samples collected were placed in labeled paper bags using a clean trowel.

Pollen sampling at Site 32 was intended to provide information on feature function and paleoenvironment. The sampling strategy employed for flotation samples was also followed for pollen samples. Thus, of the 51 pollen samples collected, 23 are from the same on-site nonfeature proveniences as the flotation samples and 12 are from the same off-site proveniences. The remaining 16 pollen samples are from two surface features and eight subsurface features. There are fewer pollen than flotation samples from features because the latter were given priority when small amounts of feature fill were present. Also, pollen samples were not taken from some features which were very near the modern ground surface because of the likely contamination by modern pollen. The amount of fill taken for each sample varied somewhat, but most samples weighed about 500 g. Samples were collected with clean trowels and placed in plastic bags and labeled paper bags.

Laboratory Processing

A fulltime laboratory with a three-person staff was maintained throughout Phase II and for the first nine weeks of Phase III (105 person-days in Phase II and [illegible] person-days in Phase III). General laboratory tasks for both phases are described below [illegible] the efforts were continuous.

Materials collected during the investigations were transported daily to the field laboratory (at the Wilderness Park Museum in El Paso) where a number of tasks were performed. First, the field bag inventory was checked to be sure that all materials sent from the site had indeed arrived at the laboratory. Discrepancies found in this check were resolved on a daily basis whenever encountered. After a laboratory inventory of bags was made, materials were then washed and air dried. Washing of surface collected artifacts and all limestone artifacts was done with tap water; many of the artifacts collected from subsurface proveniences, however, were encrusted with calcium carbonate and had to be washed in a very dilute solution of hydrochloric acid. Materials were then sorted into general descriptive categories (ceramics; ground, pecked and battered stones; chipped stone; faunal remains; historic artifacts) and cataloged with permanent ink. Items recognized as chipped or ground stone tools were given unique catalog numbers; otherwise, all items within a general artifact class and from the same minimum provenience unit were given the same catalog number. A specimen inventory sheet was then completed for each minimal horizontal provenience unit (e.g., a 1x1-m square) to show vertical provenience units (i.e., 10-cm levels), catalog numbers, number of specimens in each artifact class, date of collection, and name of collector.

After completion of the specimen inventory, the laboratory crew sorted the largest artifact class, chipped stone debitage, into technological categories (see Chapter VII). This task constituted the major portion of the effort to describe this huge body of artifact information.

The final laboratory task was the processing of special samples. Radiocarbon samples were always quite dry when collected and needed no further drying in the laboratory. After returning from the field, each sample was carefully picked over and charcoal separated from sand and rootlets. Pollen samples also required no laboratory processing as they were sent directly to the palynological consultant in the original field packaging. Two methods of processing were used for the flotation samples. These are described in Appendix B. Both methods resulted in the collection of two fractions -- a light fraction and a heavy fraction. Although the main object of study for this analysis was the light fraction, the heavy fractions of five samples were scanned under [illegible]-power magnification to look for microflakes and organic remains which may not have floated off. The results of this effort were entirely negative except for a few very small pieces of charcoal and some large pieces of modern plant remains.

Phase III

The analysis and report preparation phase began immediately following the fieldwork and entailed 455 person-days of effort. Many tasks were undertaken during this period, including the laboratory processing described above, photograph cataloging, [illegible]

illustrative materials, report typing, report editing and coordination of special studies; but the greatest effort was spent analyzing the data collected and writing the draft report. Specific methods of analysis are not detailed here but are discussed in the appropriate report chapters.

Evaluation of the Methodology

Even though some of the tasks undertaken did not provide all of the information desired, the strategies and methods employed generally did what they were intended to do. These investigations have produced a large body of useful data which adds to our understanding of prehistoric cultural adaptations in the El Paso area. That so much information could come from limited excavations (Table 4) is due mostly to the way the mitigation program was structured by the Albuquerque District. Most importantly, the funding of a Planning Phase allowed Prewitt and Associates, Inc. sufficient time to formulate a specific and detailed plan of work which served to guide the investigations from start to finish. The following discussion uses hindsight to focus on strategies and techniques which might be changed if this project could be redone.

TABLE 4

AREAS OF CONTROLLED EXCAVATIONS

	Site Area with Subsurface Fire-cracked Rocks (3100 m^2)		Site Area with Eolian Deposits (6300 m^2)		Entire Site (12,600 m^2)	
	m^2	Percent	m^2	Percent	m^2	Percent
Unit 1	95.5	3.1	95.5	1.5	95.5	0.8
Unit 2	72	2.3	72	1.1	72	0.6
Unit 3	6	0.2	6	0.1	6	-
Phase I Test Pits*	2	0.1	3	-	3	-
Sample Excavations*	12	0.4	23	0.4	23	0.2
Surface Feature Excavations*	17.25	0.6	18.75	0.3	18.75	0.1
Totals	204.75	6.7	218.25	3.4	218.25	1.7

*Does not include excavation within limits of Units 1 or 2.

While it is felt that the Phase I site visit provided enough information to plan Phase II, it is recognized that this initial fieldwork constituted essentially a testing phase and that additional information would have been valuable. Specifically, surface collection and backhoe trenching could have provided significant input into preparation of the Planning Document. Given the time constraints of Phase I, however, it was not possible to undertake a higher level of field investigation and still produce the Planning Document. That the tasks carried out in Phase I were sufficient is largely due to the fact that nothing unexpected was found during the Phase II excavations, and it is felt that under similar circumstances in the future, more-intensive Phase I fieldwork would be highly desirable.

Most of the Phase II strategies and techniques were effective and, under similar circumstances, would be used again. One technique that was not worth the effort was the recording of areas covered by vegetation and recent sand accumulations on the surface collection forms. The rationale for this effort was that it would allow the employment of a ground surface visibility factor in examining the surface distribution of artifacts and fractured rocks. It was thought that this factor could help explain anomalous high and low densities and would provide a more accurate indication of real densities than would uncorrected data. After calculating visibility factors for each surface collection unit and applying them to the fractured rock data, it was obvious that this technique was useful in explaining anomalous densities in individual cases (for individual collection units) but was not helpful for interpreting the overall distributional pattern. That is, a choropleth map of fractured rock densities corrected for visibility shows precisely the same pattern as does a map using raw densities. Obviously, the overall distribution in this case is not greatly affected by modern ground-obscuring processes.

The only substantial change in strategy which might occur if the fieldwork could be redone deals with the systematic sampling excavations. As noted, the body of data resulting from this sampling program was not used in planning the intensive excavations and was only minimally useful in helping to define the limits of the main site area. The primary utility of this information is as a body of sample artifact data which may aid in making comparisons between this site and other similarly sampled sites. However, as pointed out in Chapter VII, the artifact sample obtained in the sampling excavations is small and, in some respects, difficult to use for intersite comparisons. Given this, it can be argued that more-extensive sampling would have resulted in a more useful body of data. On the other hand, intensifying systematic sampling efforts would have detracted from the block excavation efforts, and it is felt that such a shift in focus could have been detrimental to obtaining the chronological information which is so essential to the study presented here. In short, there is no easy solution to this dilemma.

In assessing other strategies, it can be argued that more-extensive excavation of the surface features would have provided more-confident interpretations of them and that more-intensive backhoe trenching might have located additional important features; but again, it is felt that the increased level of effort necessary would have been detrimental to the intensive block excavation efforts. The block excavations were, and still are, considered the primary task of the Phase II investigation because it is felt that extensive excavations of this kind are needed to answer the kinds of questions dealt with in this research. Whether or not the block excavations at Site 32 are large enough to provide all of the desired information is problematical; but it is suggested here that Units 1 and 2 are sufficiently large to be useful for answering some of the questions asked (especially

in terms of site chronology), and that the only way that either unit could have been appreciably larger would have been to concentrate the efforts on just one of them. The decision to split the intensive excavation efforts between the two units was based on the fact that the two parts of the site appeared to differ in terms of artifact and feature contents (the Unit 1 area had only subsurface features and lacked ceramics; the Unit 2 area had surface as well as subsurface features and yielded ceramics), and it is concluded here that this decision resulted in a very informative and useful body of information. In sum, it is felt that, overall, the strategies guiding decisionmaking and the methods used to realize the strategies were appropriate to dealing with the research topics in an efficient manner. If this project were to be redone, some modified tactics would be used, but the research would be carried out in much the same way that it was.

CHAPTER VI

ARCHEOLOGICAL FEATURES

This chapter describes and interprets the cultural features encountered during the Site 32 investigations. The feature data are then used in addressing the two major research topics outlined in Chapter II -- chronology and site function. The first section of this chapter describes the methods and limitations of this analysis.

Methods and Limitations

This study focuses on feature morphology and distributional data in order to look at feature function and chronology. The first step in examining the distributional information was to construct numerous cross sections showing intact features and dispersed fire-cracked rock densities (by weight) by 1x1-m square and 10-cm level for each of the block excavation units. This allowed the definition of vertical zones based on variability in the density of dispersed fractured rocks. Then, for each zone a plan map showing intact features and dispersed fire-cracked rock densities (by weight and number) was made, and mean fire-cracked rock densities were calculated for each zone. Standard deviations were derived using the formula:

$$s = \sqrt{\frac{\sum_k (x_k - \bar{x})^2}{n-1}}$$

where: n = number of provenience units (i.e., 1x1-m squares) included in each zone

$(x_k - \bar{x})$ = the density for each square minus the unit zone

In studying the surface distribution of fire-cracked rocks, plan maps showing surface features and dispersed rock densities (by weight and number) were made (Fig. 13). An additional map, showing rock densities corrected for degree of ground surface visibility, was made to investigate the effect of this noncultural factor on the distribution, and it was concluded that the effect was negligible (see Chapter V).

Even though the feature data are informative in a number of ways, there are several factors which limit the interpretability of this information. The most pervasive of these is the sandy, homogeneous, unstratified nature of the site deposits. Macrobotanical and faunal remains and pollen were very poorly preserved at the site, and this hinders investigation of feature function. Also, it is extremely difficult to associate particular artifacts with the use of certain features or even to demonstrate approximate contemporaneity between artifacts and features. For this reason, no attempt is made here to study specific relationships between features and artifacts. Further, only the most obvious kinds of features, those with burning or rocks, were visible, and it is difficult to assess what kinds of features may not have been preserved at the site. Investigation of feature contemporaneity also is rendered problematical since the natural deposits were not stratified. This, in turn, hampers the study of the use of space, which is critical in looking at site structure and questions of social organization. Additional questions of

contextual integrity are raised by the extreme amount of bioturbation noted during the fieldwork and the lack of contrasting deposits which would allow the separation of disturbed from undisturbed soils.

In comparison to these problems caused by the nature of the site soils, the other limiting factors are minor. These include: (1) the limited extent of the block excavations which hinders assessments of site structure; (2) the unsuitability of 10-cm-thick arbitrary levels in dealing with cultural phenomena (i.e., multiple, superimposed lenses of fire-cracked rocks less than 10-cm thick) which are not horizontal; and (3) the difficulty of distinguishing between fire-fractured and naturally fractured stones (especially rhyolite) at the site. In spite of these problems, this chapter presents feature data which are used in addressing all of the general research topics.

Feature Descriptions

Thirty-four feature numbers were assigned during the Site 32 fieldwork. Two of the features (F-4 and 7) are noncultural and are not described in detail. Feature 4 is an irregularly shaped insect (probably ant) disturbance found during the Phase I excavation of N74/W99. Feature 7 is a small (50x60 cm) lag concentration of unfractured cobbles on the surface in N124/W124. A cross section trench into this feature revealed that it is entirely surficial, lacks fire-cracked rocks, and does not have associated artifacts.

The remaining 32 feature numbers were assigned to:

(1) eleven surface concentrations of fire-cracked rocks (F-1, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16);

(2) eight clusters of fire-cracked rocks (F-17, 19, 20, 21, 22, 23, 24, 26) seen in backhoe trench walls: only four were further investigated -- two (F-17, 21) are fire-cracked rock concentrations interpreted as hearths, and two (F-20, 26) are dispersed scatters of fire-cracked rocks interpreted as displaced hearth debris;

(3) two disturbances noted in backhoe trench walls: one (F-18) is a large aboriginal pit, the other (F-25) was not further investigated but is probably a recent natural feature;

(4) six fire-cracked rock concentrations (F-2, 5, 27, 31, 32, 33) interpreted as hearths, found in block excavations;

(5) two additional dispersed fire-cracked rock scatters (F-3, 28), interpreted as displaced hearth debris, found in block excavation units; and

(6) three areas with discrete, gray-stained soil lenses (F-29, 30, 34).

Thus, four basic kinds of features were found: dispersed scatters of fire-cracked rocks, fire-cracked rock concentrations, gray-stained soil lenses, and pits. This section first describes and assesses the features evident on the surface of the site and then those features found during the excavations. Features that were exposed in backhoe trenching but not investigated are not dealt with further in this chapter.

Figure 13

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FEATURES & FIRE-CRACKED ROCK DENSITIES

SURFACE MAP

[illegible]

TABLE

[illegible]

	Mean	Standard [illegible]	[illegible]
Raw weight	[illegible] kg		
Adjusted weight (adjusted for mound [illegible])	[illegible] kg	[illegible]	
Raw number	[illegible]	[illegible]	[illegible]**

* [illegible] designated [illegible]

** [illegible]

[illegible]

suggested by: (1) six of the eleven surface features initially identified as probable deflated hearths are in this part of site; and (2) [illegible] percent of the ceramics recovered during the surface collection are from this area.

On more detailed examination, however, this interpretation is not supported. While most of the surface ceramics are indeed from this portion of the site, the [illegible] distribution as a whole only partly overlaps the area with high surface fire-cracked rock densities. Further, testing of the six surface features in this part of the site yielded only one sherd. Additional evidence can be found in data from the backhoe trench [illegible] sampling excavations. Specifically, almost one-half of the high fire-cracked rock density area is beyond the limits of where subsurface fire-cracked rocks were found during the excavations (see Figs. 3 and 13); the seven sampling excavation units along the N1[illegible] and N148 lines yielded fire-cracked rocks only from the upper [illegible] cm, while [illegible] percent (by weight) of the fire-cracked rocks from sampling units to the south are from levels greater than 20 cm below the ground surface; and [illegible] percent of the artifacts from the sampling units along the N132 and N148 lines are from the upper 20 cm, while only 5[illegible] percent of the artifacts from sampling units to the south are from the upper 20 cm.*

Taken together, these lines of evidence suggest that the high density of fire-cracked rocks in the northern part of the site is largely a function of natural processes. That is, this elevated part of the site has experienced less sediment deposition and/or greater deflation than downslope areas. Whatever the specific processes, the net result is that the cultural deposits in the northern part of the site are likely to be more compressed than elsewhere and are more concentrated in the upper 10 cm of the site and on the modern ground surface. It is argued here that this high-density surface scatter is an outcropping of the dense subsurface scatter found in the block excavations.

Figure 13 shows that most of the clusters of medium-high to high fire-cracked rock density provenience units in the southern one-half of the site are probably also the result of exposure by erosion or other disturbance factors. Medium-high density areas in the southeast (around Features 10, 1[illegible] and 12) and southwest (south of Feature [illegible]) parts of the site directly follow small gullies, and a medium-high density area in the central portion of the site (east and southeast of Feature 6) follows a moderately disturbed vehicle path. In short, the exposure of fire-cracked rocks on the surface of Site [illegible] appears to reflect natural processes as much as cultural ones.

FIRE-CRACKED ROCK CONCENTRATIONS

The 11 cultural features evident on the site surface are described below; Table [illegible] summarizes descriptive data on these features. Relatively little quantitative information is available on Feature 1 because it overlies a complex group of subsurface features from which it cannot be separated with confidence. It should be noted also that all of the fire-cracked rocks are identified in the descriptions as either limestone or rhyolite even though the records indicate that other material types (e.g., quartzite, sandstone and "other igneous") were occasionally present. This is because the overwhelming majority of

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*Average number of 10-cm levels for seven units along N132 and N148 = [illegible]; average number of 10-cm levels for eighteen units to south = 4.2.

the rocks in features were of the two material types listed above and because it became apparent during the analysis phase that rhyolite had probably been consistently under-identified in the fieldwork. In any case, this simplification does not alter the interpretation of the features. The descriptions in this section are followed by a discussion of the features as a group.

Feature 1 (N121/W95)*

Feature 1 is a small to medium sized, roughly [illegible] cluster of loose and embedded, fractured limestone and rhyolite (Fig. 14a). The rocks range in size from 5-[illegible] cm, with most being 10-20 cm, and are only moderately concentrated. Feature 1 is apparently deflated but is not in an eroded part of the site.

Feature 1 was first investigated during the Phase I fieldwork when it was [illegible] sectioned with the excavation of two adjacent 1x1-m squares. Two additional 1x1-m units excavated during Phase II completely removed the remainder of the feature. These excavations failed to find any trace of a pit containing the fire-cracked rock, or to define the feature limits any better than was evident on the surface. A small [illegible] disturbed gray-stained soil was found just beneath the modern ground surface in one part of the feature.

Feature 1 partly or wholly overlies one intact fire-cracked rock feature (Feature [illegible]), [illegible] disturbed rock feature (Feature 2), and a portion of the dispersed rock scatter in [illegible]. Because of this, Feature 1 cannot be isolated readily from the materials beneath it. That it does represent a discrete hearth is argued by: (1) it contains a rock density greater than the surrounding area; (2) it is discrete horizontally; and (3) it is in an apparently stable area that has not been subject to [illegible]. It is possible, however, that Feature 1 represents a highly [illegible] exposed portion of one of the underlying features.

If Feature 1 does represent a single hearth, it was apparently built and used on a surface very near or slightly above the modern ground surface and is completely deflated. No artifacts could be associated with this hearth.

Feature 2 (N1[illegible]/W[illegible])

Feature 2 is a medium sized, [illegible] of fractured and unfractured limestone and rhyolite. The rocks, [illegible] which are loose on the surface, range in size from 4-[illegible] cm, with most being [illegible] cm, [illegible] widely dispersed. The feature is within and adjacent to a small shallow [illegible] and has [illegible] been exposed by erosion.

Two adjacent 1x1-m squares excavated [illegible] the feature yielded an average density (compared to Units 1 and 2) of fire-cracked [illegible] in the upper [illegible] cm. This average density and the fact that Feature 2 [illegible] suggest that the feature may represent only a fortuitous [illegible] rock scatter rather than the remains of an in situ hearth. The [illegible] of the surface

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*Grid coordinates given are the [illegible] center of the feature.

TABLE [illegible]

SURFACE FEATURE DESCRIPTIVE SUMMARY

Feature #	Area as Mapped (m^2)	# of Rocks Mapped	Area Excavated m^2	%	Amount of FCR* Excavated Wt. (kg)	#	Mean kg/m^2 (Excavated FCR)	Kg/piece (Excavated FCR)	#/m^2 (Total Surface)	#/m^2 (Excavated)
[illegible]	[illegible]	51	-	-	-	-	-	-	17.[illegible]	-
[illegible]	[illegible].4	6[illegible]	2.0	23.8	15.[illegible]	46	7.5	[illegible].33	7.2	23.0
[illegible]	.3	[illegible]	[illegible]	[illegible]	[illegible]	ca. [illegible]	[illegible]	ca. [illegible]	[illegible]	ca. 33.3
[illegible]	15.4	206	1.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	13.4	20.3
[illegible]	4.[illegible]	[illegible]	[illegible]	[illegible]	.4	[illegible]	[illegible].4	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	41.[illegible]	[illegible]	-*	4.[illegible]	[illegible]	[illegible]	-**
[illegible]	[illegible]	[illegible]	1.25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible].14	[illegible]	40.[illegible]
[illegible]	[illegible]	23[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible].3
14	[illegible].4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible].4	108.[illegible]
[illegible]	[illegible]	[illegible]	1.[illegible]	4[illegible]	.4	-**	.[illegible]	-**	[illegible]	-**
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-**	-**	-**	-**	[illegible]	-**

*FCR [illegible]

**[illegible] recorded.

Figure 14. Surface Features.

a. View to the north of Feature 1 (scale in decimeters).

b. View to the west of Feature 9; note large cobbles (scale in centimeters and inches).

Figure 14

a

b

[illegible] to Feature [illegible] tentatively suggests that Feature 8 may relate to the Mesilla Phase [illegible] Site 32.

Feature 8 (N[illegible]/W121)

Feature 8 appears on the surface as a small (ca. 50x25 cm), oval concentration of [illegible], fractured limestone. The few rocks present (n = 10) range in size from 5-15 cm [illegible] appear to have been cracked in place. Feature 8 does not appear to be badly eroded.

A total of 2.25 m^2 was excavated in cross sectioning and completely removing this feature. Feature 8 (Figs. 15 and 34a) was found to be a tight concentration (80 cm north-south by 70 cm east-west) of seven large (15-40 cm in diameter) limestone cobbles and [illegible] boulders, and a number of spalls off of these boulders (total weight = 137.2 kg). The concentration is roughly oval in plan and extends from the modern ground surface to [illegible] cm below the surface. The boulders are not arranged in any particular way; they seem just to have been piled together. Although no pit outlines are visible, the rocks must have been in a pit approximately 30-35 cm deep. The lack of charcoal or charcoal-staining is curious in view of the in situ fracturing of most of the boulders; however, that these fractured boulders are essentially still intact indicates that if the fracturing is due to heat, it must have resulted from a single episode of burning rather than repeated episodes. It is quite possible that charcoal from a single episode of burning would not be preserved in the sandy soils at Site 32.

Feature 9 (N136/W115)

Feature 9 is a large, roughly oval concentration of loose and embedded, fractured and unfractured limestone and rhyolite (see Fig. 34b). The rocks range in size from 3-35 cm. Small well-fractured rocks occur most densely in the western one-half of the feature. Several boulders (over 25 cm in diameter) are concentrated in the eastern end and along the northern edge. The rocks are only moderately concentrated within the feature as a whole. The western edge of Feature 9 has been cut by gullying, but the main part of the concentration does not appear to be badly eroded.

Three adjacent 1x1-m squares were excavated into the eastern end to provide an east-west cross section. This cross-section trench yielded a slightly above average density (by weight) of fractured and unfractured rocks, concentrated in, but not restricted to, the upper [illegible] cm. These excavations did not locate any stained soil or pit margins but did reveal a roughly oval ring (ca. 1.3 m in diameter) of rocks in the two westernmost 1x1-m squares. This tentatively identified ring suggests that Feature 9 may represent numerous overlapping features rather than a single large one. In fact, however, this trench does not provide enough information to fully interpret Feature 9. Nonetheless, this feature does appear to mark an area of relatively intense hearth activity originating from a surface very near the modern ground surface. While the large boulders seem too massive to be used (or intended for use) in hearths, the occurrence of equally massive rocks in Feature [illegible] suggests that large size was not a negative factor in choosing hearth rocks.

No directly associated artifacts were found, but the occurrence of 42 sherds on the site surface near Feature 9 suggests that it may belong with the Mesilla Phase component.

Figure 15

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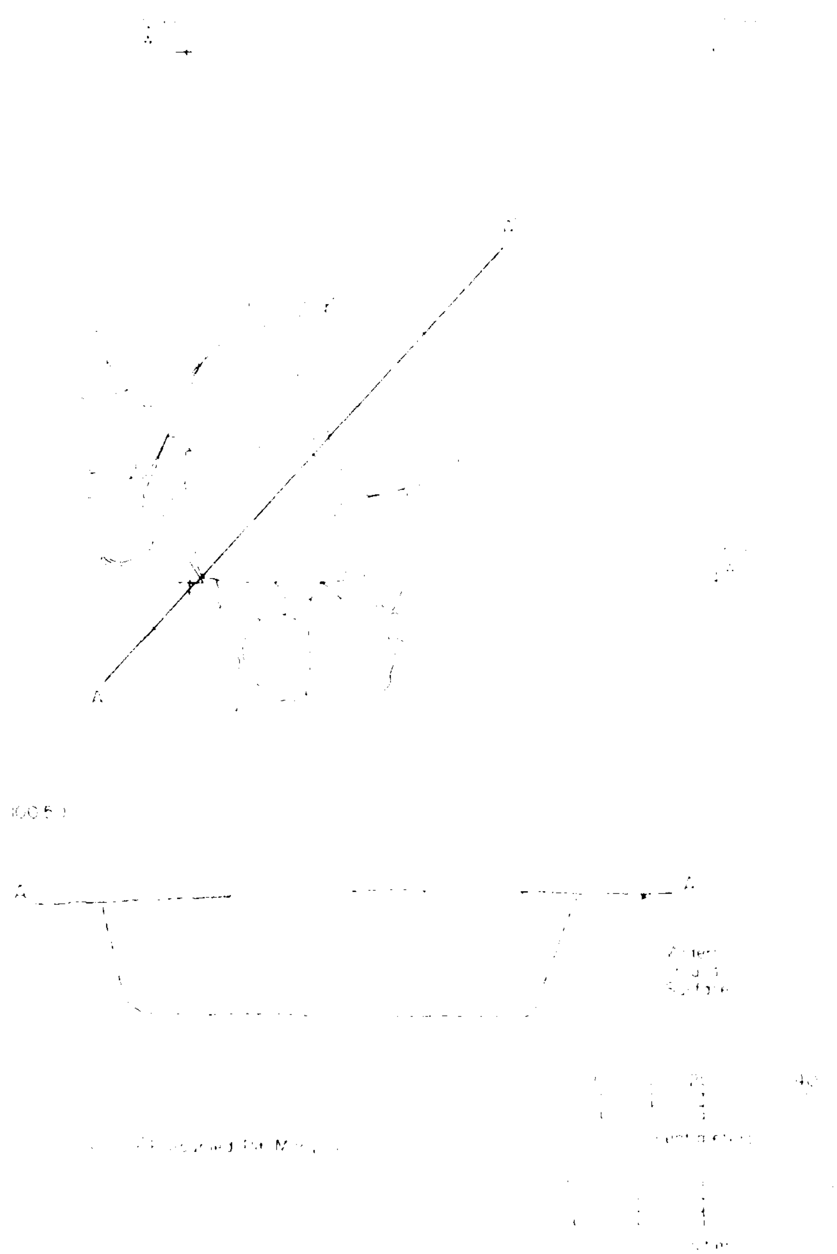
FEATURE 8

PLAN MAP & CROSS SECTION



Feature 10 (N78/W78)

Feature 10 appears on the surface as a small, roughly oval cluster of fractured and unfractured limestone and rhyolite. Most of these rocks are loose on the surface, but some are embedded. The rocks range in size from 4-28 cm, with most being [illegible]-10 cm, and are moderately concentrated. Feature 10 has obviously been exposed and disturbed by a small gully.

A total of 1 m^2 was excavated in cross sectioning and removing this feature. The excavation yielded an average density scatter of fire-cracked rocks concentrated in the upper [illegible] cm and located a small (ca. 50x50-cm), shallow (ca. 10-cm), basin-shaped pit containing darkly stained fill. Although some small charcoal flecks were noted in this fill, chunky charcoal was lacking. This pit was first detected after 1-[illegible] cm of recently blown sand was removed from the surface, and its upper portion has probably been removed by erosion. Although extremely rodent-disturbed, the pit boundaries are easily defined. This pit is interpreted as representing the bottom portion of a hearth which has been disturbed by gully erosion. The fractured rocks on the surface of the feature probably represent displaced hearth rocks.

Feature 11 (N86/W78)

Feature 11 is a small, roughly linear cluster of fractured limestone and rhyolite, all of which are loose on the surface. The rocks range in size from 4-12 cm and are only moderately concentrated. Feature 11 borders both sides of and has obviously been exposed by a small gully.

The eastern portion (apparently the most intact part) of Feature 11 was investigated with a 3.0x0.5-m trench. Only the southern 1.0-m-long segment of this trench was within the limits of the feature as mapped on the surface. These excavations yielded an average density scatter of fire-cracked rocks throughout the entire trench and failed to produce any evidence that the feature represents a discrete or in situ hearth. Rather, Feature 11 represents a dispersed rock scatter exposed by erosion.

Feature 12 (N86/W74)

Feature 12 is a large, roughly rectangular concentration of fractured and unfractured limestone and rhyolite. Almost all of the rocks are loose on the surface. The rocks range in size from 2-15 cm, with most being 5-10 cm, and are moderately concentrated. Feature 12 is bisected along its long axis by a small gully which has exposed and disturbed the feature.

Feature 12 was investigated with the excavation of a total of 2 m^2 (a 3.0x0.[illegible]-m trench and an adjacent 1.0x0.5-m unit) providing an east-west cross section through the entire surface concentration. These excavations yielded an average density scatter of fire-cracked rocks concentrated on the surface and in the upper 1[illegible] cm. No evidence was found suggesting that Feature 12 represents a discrete or in situ hearth. Rather, Feature [illegible] appears to be a dispersed rock scatter exposed by erosion.

Feature 13 (N1[illegible]/W[illegible])

Feature 13 is a moderately large, roughly circular concentration of fractured limestone and rhyolite (Figs. [illegible] and [illegible]). Only a small number of the rocks are unfractured,

Figure 16

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FEATURE 13

PLAN MAP

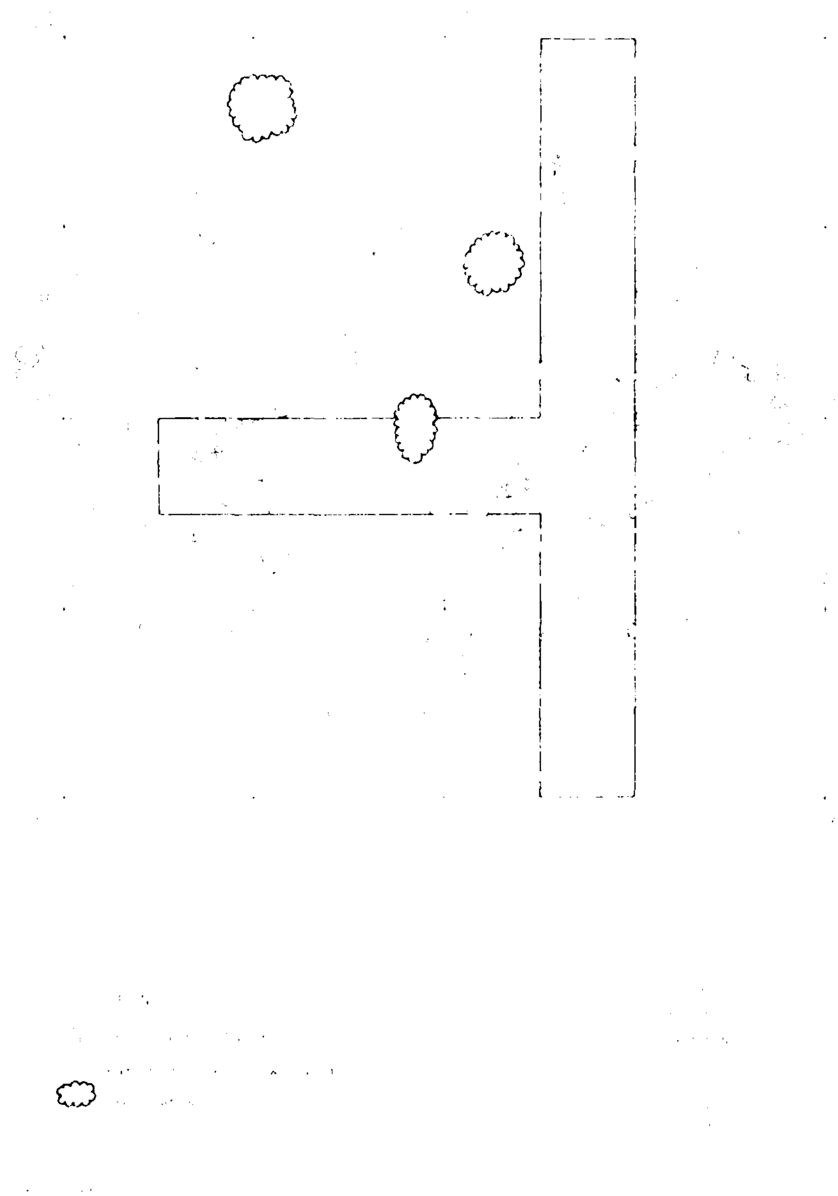

Figure 17. Surface Features.

a. View to the northwest of Feature 13 (scale in centimeters and inches).

b. View to the northwest of Feature 14 (scale in centimeters and inches).

Figure 17

a

and almost all are loose on the surface. A number show in situ fracturing and thus appear to be minimally displaced. The rocks range in size from 3-15 cm, with most being 5-10 cm, and are moderately concentrated. Feature 13, although apparently deflated, does not appear to be badly eroded.

A total of 3 m² was excavated into this feature (a 4.0x0.5-m north-south trench and a 2.0x0.5-m east-west trench) to provide a full north-south cross section and a partial east-west cross section. These excavations yielded an average to high density scatter of fire-cracked rock concentrated on the surface and in the upper 10 cm. A heavily disturbed and diffuse area with gray-stained soil was found in the central part of the concentration, but no pit margins could be identified. Based on its horizontal and vertical discreteness, the high fire-cracked rock density, the gray-staining, and the lack of erosion in that part of the site, Feature 13 is interpreted as representing one or more fire-cracked rock hearths which were built on or near a surface very close to the modern ground surface.

Feature 14 (N133/W90)

Feature 14 is a small, roughly circular cluster of fractured limestone and rhyolite (Fig. 17b). Most of the rocks are loose on the surface, and some show in situ fracturing. The rocks range in size from 3-9 cm and are fairly densely concentrated. Feature 14 is apparently deflated but is not badly eroded.

A single 1x1-m square was excavated into the feature (only 0.8 m² of this square actually was within the feature). This test pit revealed a high density scatter of well-fractured rocks concentrated on the surface and in the upper 10 cm. Some very diffuse gray-staining was noted in the fill surrounding the rocks, but pit margins could not be defined. As with Feature 13, Feature 14 is interpreted as a deflated rock hearth due to its discreteness, high fire-cracked rock density, gray-staining and location in a relatively uneroded part of the site.

Feature 15 (N116/W81)

Feature 15 is a small, oval concentration of fractured and unfractured limestone and rhyolite. A number of the rocks are embedded, but most are loose on the surface. The rocks range in size from 5-30 cm, with most being 5-10 cm, and are widely scattered. Feature 15 is apparently deflated but is not visibly eroded.

A single 1x1-m test pit was excavated into the main part of the rock concentration. This pit yielded only an average density rock scatter distributed through the upper 20 cm. The northeast one-quarter of this test pit does contain, however, a small (50 cm north-south by at least 50 cm east-west), semicircular, basin-shaped, dark-stained soil lens containing a small amount of woody charcoal. This lens extends eastward beyond the test pit and thus the full east-west dimension is not known. Vertically, it extends from about [illegible] cm below modern ground surface. Although not fully investigated, this lens is interpreted as representing the fill in a small, shallow pit which originally contained a rock hearth. The fractured rocks on the surface probably represent the deflated and scattered debris from this hearth. The woody charcoal from Feature 15 was collected as a radiocarbon sample, but was not submitted because of the small size of the sample and the [illegible] context.

Feature 16 (N145/W131)

Feature 16 is a large, roughly circular concentration of fire-cracked [illegible] limestone and rhyolite (Fig. 18). Most of the rocks are [illegible] on the surface. [illegible] range in size from 2-30 cm, with most being 5-10 cm, and [illegible]. Feature 16 is on a small sand-and-gravel-covered knoll in the [illegible] site.

A single 1x1-m test pit was excavated in the northwestern part of the feature. [illegible] pit extended only 4-[illegible] cm below ground surface before basal gravels were encountered, [illegible] thus it appears that Feature 16 is almost entirely restricted to the surface. This feature cannot be confidently assessed since it appears to be [illegible]. It is likely, however, that Feature 16 represents the remains of one or more hearths.

DISCUSSION OF SURFACE FEATURES

Of the eleven surface features, only one (Feature [illegible]) [illegible]; three (Features [illegible] and 17) appear to represent fortuitously exposed [illegible] scatter of fire-cracked rocks; and seven (Features [illegible], 10, 12, 14, 15 and 16) are [illegible] to represent deflated individual fire-cracked rock hearths or clusters of hearths. [illegible], this body of information is of limited interpretability. The [illegible] hearths is based on a variety of factors including relatively high fire-cracked rock densities, presence of gray-stained soil, horizontal and vertical [illegible], and presence of basin-shaped depressions or pits; however, the critical factor is the location of the features relative to modern erosional features. That is, of the four features which are exposed by gully erosion, three (Features [illegible], 11 and 17) are interpreted as representing dispersed rock scatters. The fourth (Feature [illegible]) is interpreted as a hearth [illegible] rock scatter overlies a small basin-shaped depression with gray-stained [illegible]. Thus, [illegible] of the surface features which do not [illegible] any [illegible] areas are interpreted as hearth remnants.

Tables [illegible] and [illegible] show clearly that each of the surface features has a mean number of rocks per surface area [illegible] greater than the mean number for the site surface as a whole. The fire-cracked rock densities found in excavating the surface features, however, do not even approach those for the subsurface rock features [illegible]. This is not too surprising, though, since the surface features are deflated.

A comparison of Table [illegible] and [illegible] Table [illegible] shows that, excluding Feature [illegible], only four of the [illegible] features [illegible] have [illegible] higher weights and/or [illegible] of excavated fire-cracked rock per [illegible] than [illegible] the dispersed rock scatters [illegible] the two [illegible] of these [illegible] interpreted as [illegible] hearths. Two (Features [illegible]) of the [illegible] deflated hearths have [illegible] quantitative [illegible], but [illegible] probably be included in the above-average density group [illegible] recorded. The seventh deflated hearth [illegible], and most of the fire-cracked rocks have [illegible] been removed by erosion. [illegible] provide [illegible] quantitative evidence [illegible] of the surface features as deflated hearths or clusters of hearths. Unfortunately, [illegible] about these features [illegible].

The single surface feature which is intact, Feature 8, is comparable to the subsurface rock features in terms of the amount of rock present. It differs, however, in that the rocks are of a single material type (limestone) and are large (small boulders). As noted, these rocks are believed to be in a pit, although pit margins cannot be defined, and most show in situ fracturing. That some in situ heating was involved in the fracturing of the rocks seems evident, but the lack of charcoal or charcoal-stained [illegible] is curious. The most economical explanation is that Feature 8 was used only once, that the fire burned to completion leaving mostly ashes rather than charcoal, and that the remnants of the fire were not preserved in the sandy site sediments. If Feature 8 was used as a hearth, it is interesting because it shows the selection and transportation (at least 40 [illegible]) of a particular kind and size of rock for initial hearth use. This anomalous situation raises a number of questions, including: (1) Were large rocks generally preferred in the early stages of hearth use? (2) Were burned rocks not scattered over the site surface after Feature 8 was used and thus not available for reuse in Feature 8 (i.e., was Feature 8 used very early in the site history)? (3) Was Feature 8 used for a particular function requiring large rocks? and (4) Why was Feature 8 used only once when other features appear to have been used multiple times?

As discussed above, it was initially thought that most of the surface features and dispersed fractured rocks reflected a late occupation of the site. Since it is now clear that the northern part of the site has simply received less deposition than other parts, it is much more difficult to assess temporally the surface features. Feature 1 does appear to overlie the dense rock scatter in Unit 2, and thus it dates to the latter part of the site occupation. Also, almost one-half of the ceramics from the site were found on the surface adjacent to Feature 9, and this large feature may thus date to the Mesilla Phase. The single sherd recovered in excavating Feature 8, although not definitely associated with the feature, may also indicate a Mesilla Phase association for this hearth. Otherwise, the surface features in the northern site area could belong with any of the occupational periods represented. The features interpreted as eroded dispersed rock scatters also cannot be placed temporally, but based on the density of rocks observed, they may relate to the occupation which resulted in the accumulation of the dense burned rock zones in Units 1 and 2.

Features in Block Excavations

This section describes and interprets the cultural features encountered in the block excavation units. These [illegible] features are separated into four descriptive feature types.

DISPERSED FIRE-CRACKED ROCK SCATTERS

Four feature numbers are used to refer to dispersed scatters of fire-cracked rocks -- Features [illegible] in Unit 1, Features [illegible] and 28 in Unit [illegible], and Feature 26 in Unit [illegible]. As discussed later, these scatters (Fig. [illegible]) are interpreted as representing heavily disturbed hearths and discarded hearth debris. Table [illegible] provides summary descriptive data on these scatters.

Before presenting narrative descriptions, [illegible] points are noted. First, the dispersed scatters found in the block units are [illegible] more extensive than the units [illegible], and the full dimensions of these scatters remain unknown. In fact, data from

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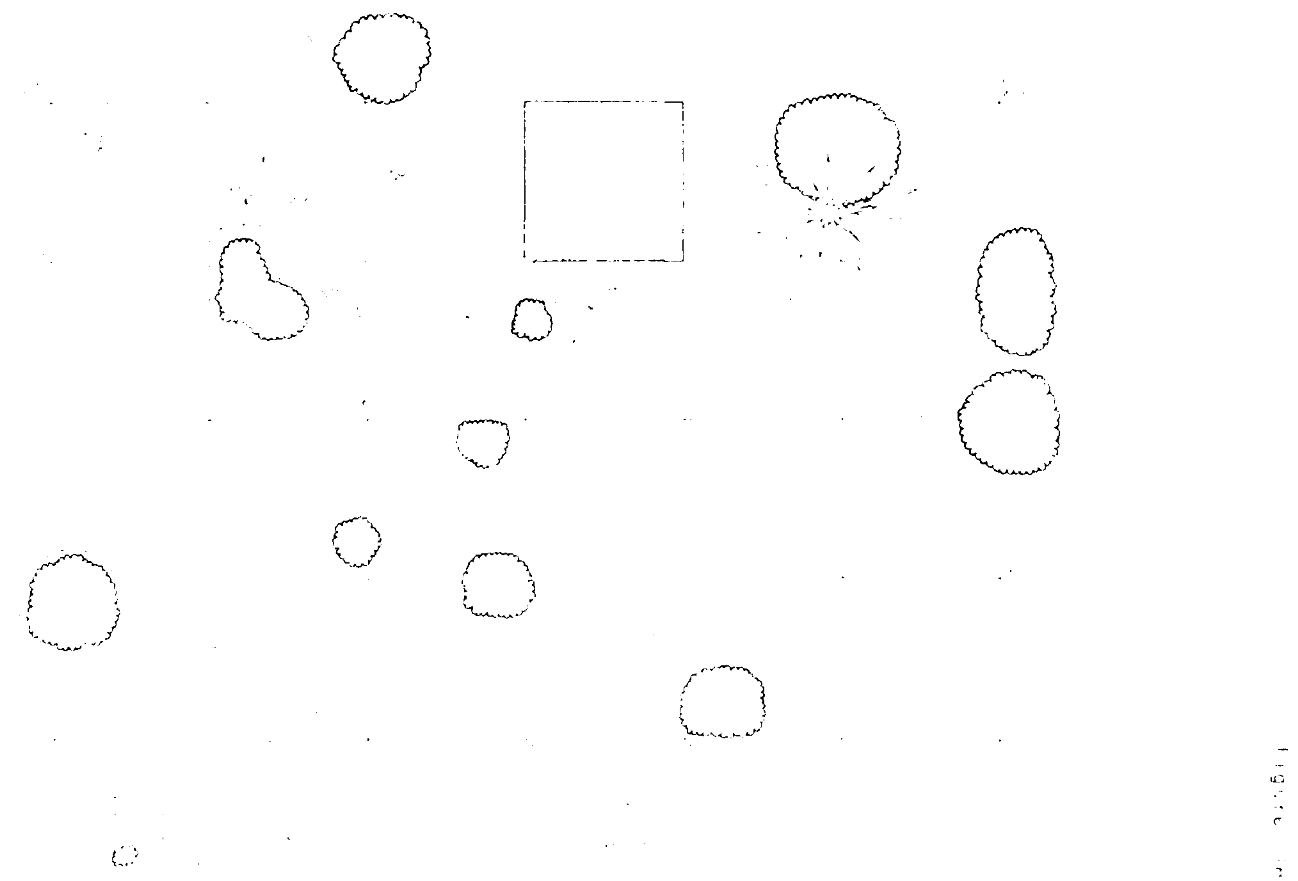
FEATURE 16

PLAN MAP



Figure

Figure 19. Dispersed Scatters of Fire-cracked Rocks.

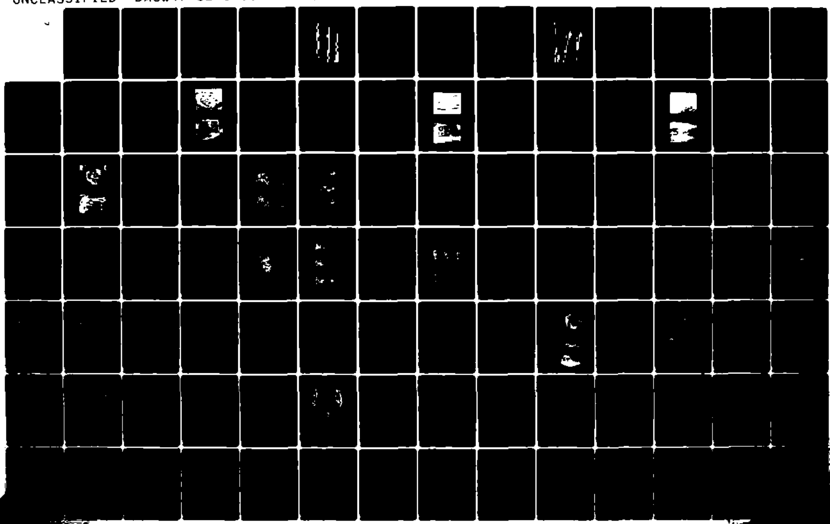
a. View to the west of scattered fire-cracked rocks in Unit 1 (scale in centimeters and inches).

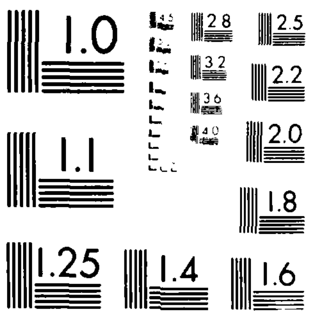
b. View to the northeast of scattered fire-cracked rocks in northern part of Unit 2; large cobble in foreground is beside Feature 27 (excavated); darkly stained Feature 32 (unexcavated) in right center part of photograph.

Figure 19

AD-A142 029 INVESTIGATIONS AT SITE 32 (41EP325) KEYSTONE DAM PROJECT A MULTICOMPONENT..(U) PREWITT AND ASSOCIATES INC AUSTIN TX R C FIELDS ET AL. MAR 83 2/ 4

UNCLASSIFIED DACW47-82-C-0018 F/G 5/6 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

block units, sample units and backhoe trenches suggest that a continuous subsurface scatter may cover as much as 3100 m^2 of the site (see Fig. 3). Second, the scatters in Units 1 and 2 are considered to have been comparably investigated even though the Unit 1 excavations were generally shallower than those in Unit 2 (33 cm versus 42 cm). The greater average depth of excavations in Unit 2 is due to the presence there of more-deeply buried deposits. A square-by-square evaluation of the vertical distribution of fire-cracked rocks in Unit 1 and 2 reveals that 94.3 percent of the Unit 1 provenience units and 95.9 percent of those in Unit 2 were excavated to a level demonstrably lower than the main rock scatter or to a level probably corresponding to the base of the dense rock scatter (based on data from nearby deeper units). Thus, it is likely that significant portions of the dispersed scatters were incompletely excavated in nearly equal percentages of provenience units in both Units 1 and 2 and that the data sets from the two units are indeed comparable.

Third, the feature numbers given to these rock scatters were not used consistently throughout the excavations. That is, the numbers were assigned for ease of reference, but in some cases (for example, where Features 20 and 28 overlap) it was impossible to discern one scatter from another or to interpret how many scatters were actually present. Thus, in many of the field notes these feature numbers are not used.

Unit 1 (Fig. 20)

About 66 percent (by number) of the dispersed fire-cracked rocks in Unit 1 are limestone; the remainder are primarily rhyolite. Most of the fire-cracked rocks occur in a 10-20-cm-thick zone, the top of which is 10-25 cm below the modern ground surface (Fig. 21). This zone generally follows the ground surface, sloping down about 20 cm from northeast to southwest. Distinct depositional episodes within this zone could not be defined although a deposit of this thickness surely represents repeated or long-term occupations.

All of the excavation units that extend below the dense scatter have small amounts of fire-cracked rocks in their lower levels. This very light scatter may reflect hearth use predating the dense scatter or the downward displacement of rocks. Extending from the top of the dense rock zone upward to the modern ground surface, another light scatter (10-25 cm thick) is present. The lower portion of this upper scatter may represent materials displaced from the underlying dense rock zone; however, it seems unlikely that upward displacement could account for all of the light scatter. Thus, this upper scatter is interpreted as representing activities postdating the deposition of the dense rock scatter.

For this analysis, the dispersed rocks in Unit 1 have been separated vertically (Fig. 22) into two zones -- the upper light scatter (the upper zone) and the lower dense scatter (the lower zone). Fractured rocks found below the dense scatter are not isolated as a separate zone because of the limited information gathered on these deeper deposits.

Unit 2 (Fig. 23)

The dispersed scatter of fire-cracked rocks in Unit 2 is about 73 percent limestone; most of the remainder is rhyolite. This scatter, or more accurately group of scatters, appears more complex than that in Unit 1 and is more difficult to describe. This complexity is due mostly to the fact that the southern part of the unit (from about N110 southward) has been relatively active in terms of sediment deposition and thus has cultural deposits distributed over a greater vertical distance than most of the other parts of the site.

TABLE 7

SUMMARY OF DESCRIPTIVE DATA FOR DISPERSED FIRE-CRACKED ROCK SCATTERS IN BLOCK EXCAVATION UNITS

	Weight	Number	Weight/Piece
Unit 1:			
Upper	$\bar{x}$ = 0.9 kg/m^2 s = 1.5 n = 91	$\bar{x}$ = 6.7 pcs/m^2 s = 5.0 n = 79	$\bar{x}$ = 0.13 kg/pc - -
Lower	$\bar{x}$ = 5.8 kg/m^2 s = 2.9 n = 96	$\bar{x}$ = 35.5 pcs/m^2 s = 20.9 n = 95	$\bar{x}$ = 0.18 kg/pc - -
Total	$\bar{x}$ = 6.6 kg/m^2 s = 3.3 n = 96	$\bar{x}$ = 40.2 pcs/m^2 s = 21.9 n = 97	$\bar{x}$ = 0.16 kg/pc s = 0.07 n = 100
Unit 2:			
Upper	$\bar{x}$ = 1.1 kg/m^2 s = 1.4 n = 42	$\bar{x}$ = 13.1 pcs/m^2 s = 9.3 n = 43	$\bar{x}$ = 0.07 kg/pc - -
Middle	$\bar{x}$ = 4.5 kg/m^2 s = 3.3 n = 67	$\bar{x}$ = 36.8 pcs/m^2 s = 23.9 n = 67	$\bar{x}$ = 0.15 kg/pc - -
Lower	$\bar{x}$ = 4.5 kg/m2 s = 1.5 n = 58	$\bar{x}$ = 10.1 pcs/m^2 s = 8.1 n = 59	$\bar{x}$ = 0.07 kg/pc - -
Total	$\bar{x}$ = 5.9 kg/m^2 s = 4.1 n = 66	$\bar{x}$ = 51.2 pcs/m^2 s = 28 n = 66	$\bar{x}$ = 0.12 kg/pc s = 0.07 n = 73
Unit 3:	$\bar{x}$ = 6.8 kg/m^2 s = 2.4 n = 6	$\bar{x}$ = 44.5 pcs/m^2 s = 14.9 n = 6	$\bar{x}$ = 0.17 kg/pc s = 0.05 n = 6

$\bar{x}$ = mean.

s = standard deviation.

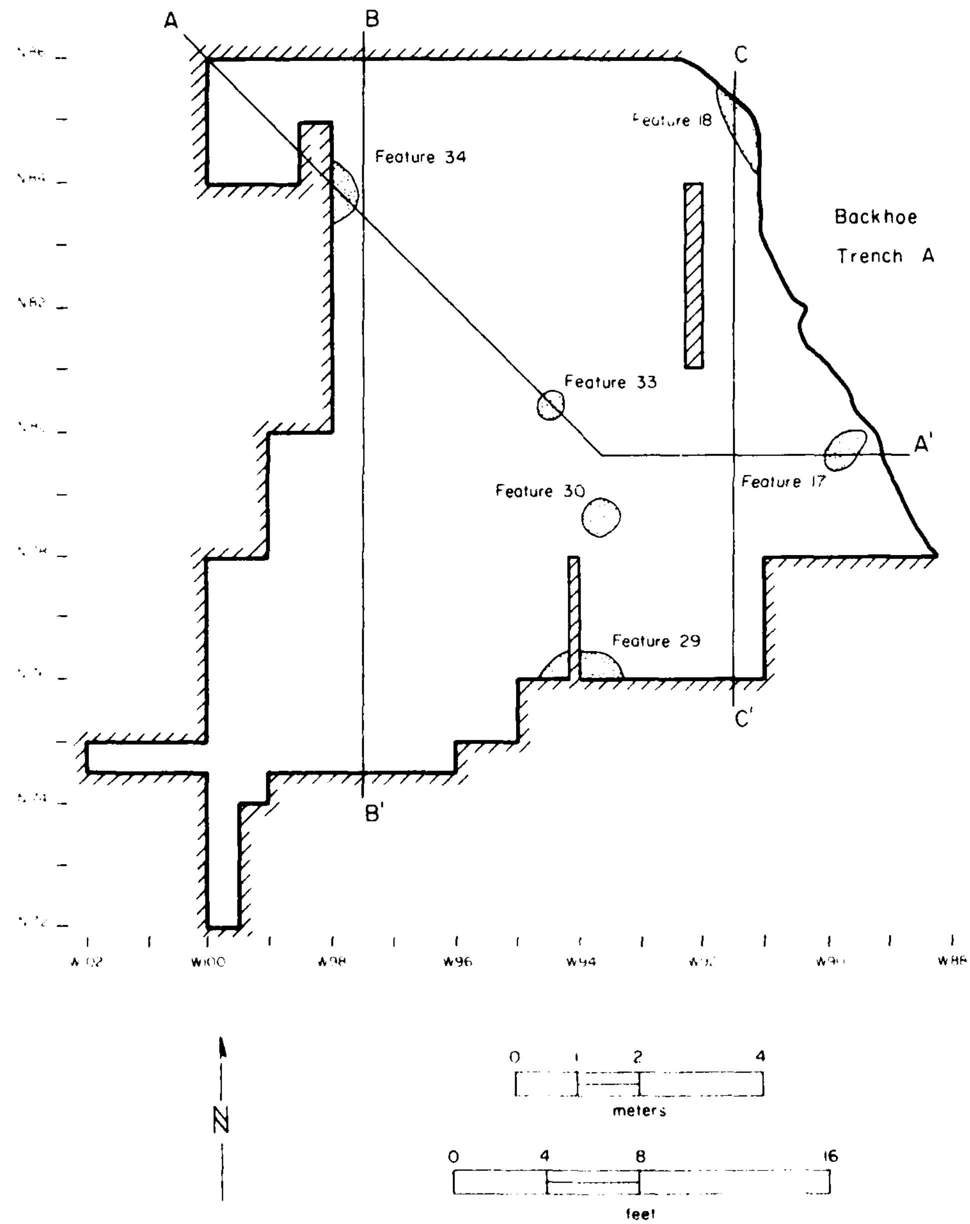
n = number of horizontal provenience units.

Figure 20

KEYSTONE DAM PROJECT

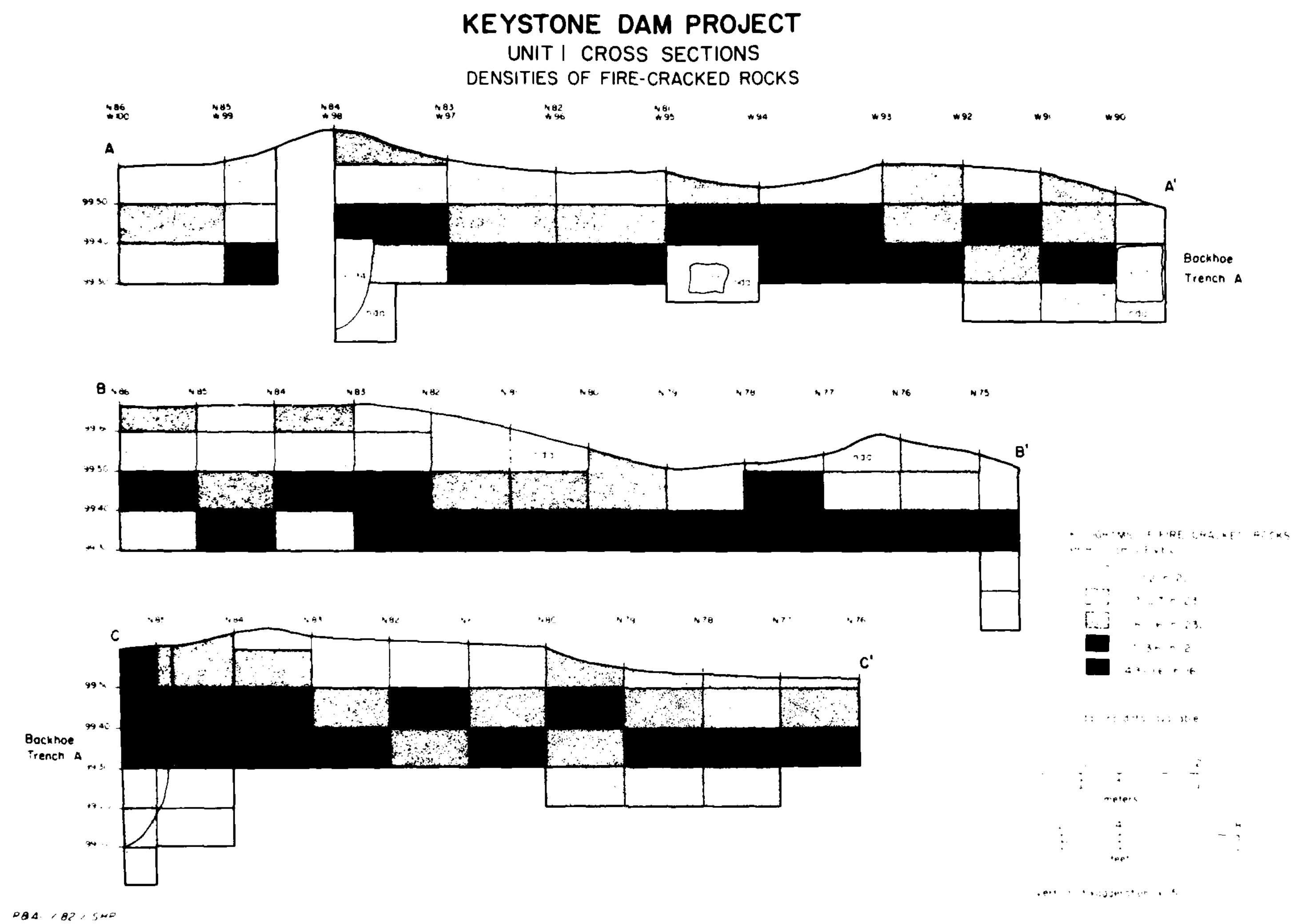
UNIT I

PLAN MAP



PAA 82 / SHP

Figure 21



KEYSTONE DAM PROJECT
UNIT I CROSS SECTIONS
DENSITIES OF FIRE-CRACKED ROCKS
A
A'
B
B'
C
C'
Backhoe Trench A
Backhoe Trench A
N86 W100
N85 W99
N84 W98
N83 W97
N82 W96
N81 W95
W94
W93
W92
W91
W90
99.50
99.40
meters
feet
PBA / 82 / SHP

Figure 22

KEYSTONE DAM PROJECT
UNIT I CROSS SECTIONS
ZONES OF FIRE-CRACKED ROCKS

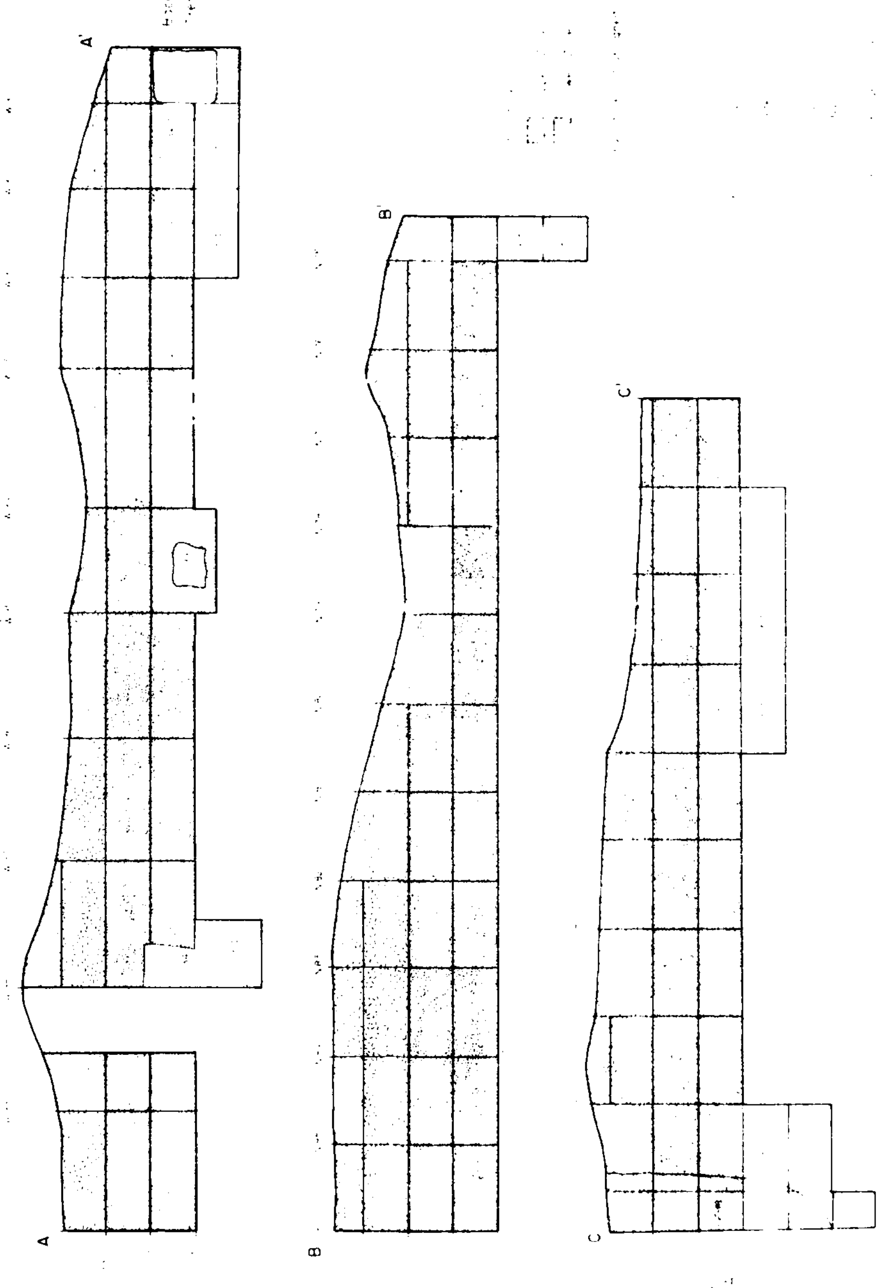
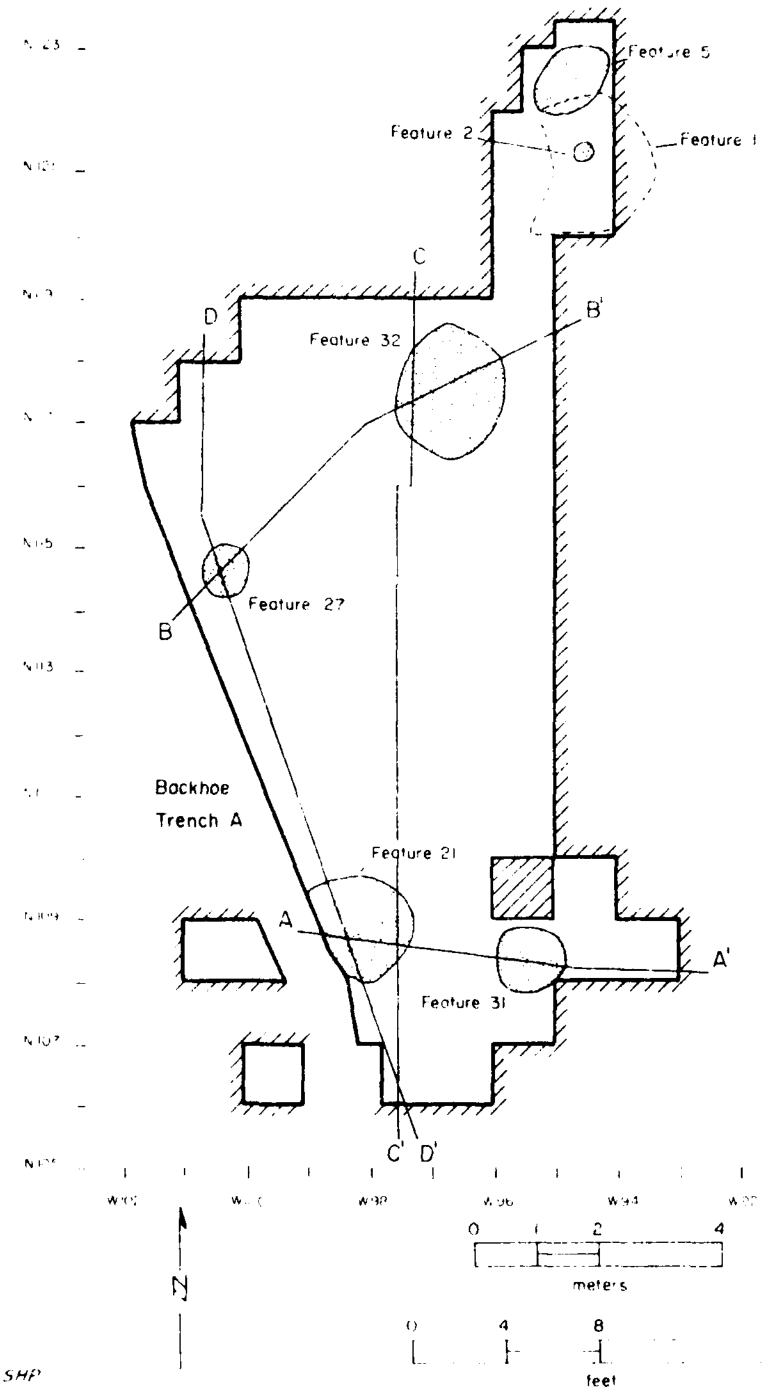


Figure 23

KEYSTONE DAM PROJECT
UNIT 2
PLAN MAP



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The northern part of the unit generally has a 5-15-cm-thick zone (the upper zone) containing a low density fire-cracked rock scatter overlying a 10-20-cm-thick zone (the middle zone) with high fractured rock densities (Feature 20) overlying another low density scatter (the lower zone) (Fig. 24). The high density zone generally follows the contour of the modern ground surface north of about the N110 line, sloping down gently to the south and west. Overall, the dispersed scatter in the northern part of Unit 2 looks much like that in Unit 1.

The southern part of the unit differs in that the dense scatter zone is more deeply buried (the top is 20-25 cm below the surface), is overlain by two burned rock features (one with a radiocarbon date of A.D. 520 ± 70) which are surrounded by a low to high density rock scatter, and is underlain by a low to high density scatter of relatively little-fractured rocks (Feature 28). Figures 24 and 25 show that the dense scatter starts to basin upwards in the southeastern corner of the unit. It appears that the deposits in the southern part of Unit 2 accumulated in a basin which, throughout the site occupation, received relatively more depostion than the rest of Unit 2. It is thus possible to define a sequence of events involving, from earliest to latest: (1) accumulation of a considerable quantity of well-fractured and little-fractured rocks (Feature 28); (2) accumulation of the dense scatter of well-fractured rocks (Feature 20); and (3) use of Features 21 and 31 and accumulation of well-fractured rocks around and above these features. In this discussion, these are called the lower, middle and upper zones (Fig. 25).

The lower zone is easily separable from the middle because its rock densities are either much lower or, if they are not lower, the rocks are much less fractured. Thus, Features 20 and 28 were usually readily recognized in the field. The upper zone is less obviously different from the middle in the southern part of the unit because of the high densities of well-fractured rocks around Features 21 and 31. In fact, it was originally thought that Feature 20 was simply thicker (ca. 30 cm) in this part of Unit 2 and that Features 21 and 31 related to the latter part of the Feature 20 accumulation. The current interpretation, that Features 21 and 31 and the surrounding low to high density scatter represent distinct occupations completely postdating Feature 20, is based primarily on three radiocarbon dates from Unit 2 which put Feature 20 in the northern portion of the unit at somewhere between about 2160 B.C. and 650 B.C. and Feature 21 at about A.D. 520. Feature 31 is assumed to be roughly contemporaneous with Feature 21 based on their identical vertical positions.

The correlation of the three zones at the southern end of Unit 2 with the three at the northern end is based on the fact that Feature 20 is nearly continuous throughout the unit and serves to isolate what is above and below it. Because of the compressing or thinning out of the deposits to the north and the use of 10-cm levels in the excavations, not all three zones are isolated throughout the unit. It is also noted that, while Features 27 and 28 confirm the presence of hearths in the lower zone, some of the lower zone fire-cracked rocks may be displaced from the dense middle scatter. Also, it is important to note that each of the three defined zones undoubtedly represents multiple occupations. This is most obvious within the middle zone where, during excavation, crewmembers occasionally were able to discern two to four layers of fractured rocks, each layer separated from the next by only 2-3 cm. Unfortunately, these evidences of apparently discrete occupational episodes were not preserved consistently enough to be of any use.

KEYSTONE DAM PROJECT

UNIT 2 CROSS SECTIONS

DENSITIES OF FIRE-CRACKED ROCKS

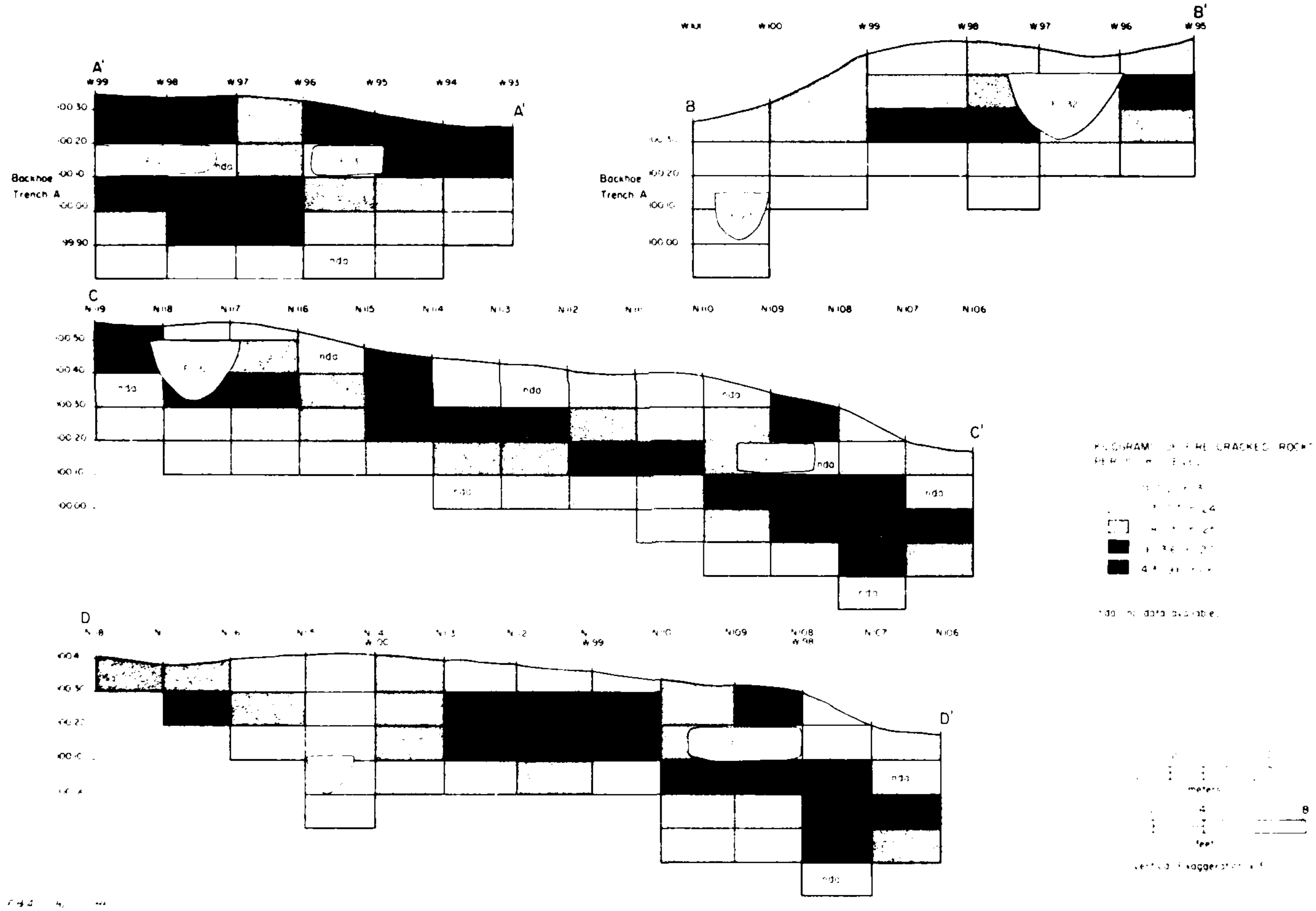


Figure 24

Unit 3

Approximately 82 percent of the cracked rocks from Unit 3 are limestone; most of the remainder are rhyolite. The dense scatter of rocks (designated Feature 26) occurs in a 10-20-cm-thick zone, the top of which is 15-25 cm below modern ground surface. The base of this zone slopes downward (about 5-10 cm) from east to west. This dense scatter is overlain by a light scatter of fractured rocks extending up to the modern ground surface; thus, this part of the site, like those areas sampled by Units 1 and 2, must have been occupied subsequent to the occupations which resulted in the dense fractured rock accumulation. While distinct depositional episodes cannot be discerned in either of the zones, both are presumed to represent repeated and/or long-term occupations.

The Unit 3 fractured rocks are not subdivided vertically for analysis because of the small size of the unit. Also for this reason, the horizontal distribution of the rocks is not studied.

FIRE-CRACKED ROCK CONCENTRATIONS

Included here are eight concentrations of rocks which are interpreted as hearths. All but one (Feature 2) are essentially intact. Feature 2 cannot be described in as much detail as the others but can be assessed as a disturbed hearth with some confidence. Table 8 provides summary descriptive data for these features. Narrative descriptions are found below.

Feature 2 (Unit 2; N121/W94)

Feature 2 was first encountered during the Phase I investigations at 48 cm below the modern ground surface in the east wall of N121/W95 and appeared as a lens (ca. 30x4 cm) of charcoal-flecked sand. The excavation of N121/W94 revealed that this lens was within a rodent burrow and that the charcoal-flecked soil had been displaced from a roughly cylindrical feature (30-35 cm in diameter) at 5-20 cm below the surface. This disturbance contained gray-stained soil without charcoal and about a dozen fractured and fire-blackened rocks.

This feature is interpreted to represent the remains of a hearth, but the rodent disturbance is so extreme that the feature margins can be identified only tentatively. Thus, while the nature of the fill, the blackening of the rocks, and the quantity of rocks in this square (Feature 2 rocks were not quantified separately) all suggest that Feature 2 was once a hearth, the lack of intactness prevents any precise description.

Based on the location of the most recognizable part of the feature within the dense scatter of fire-cracked rocks, Feature 2 is assigned to the middle zone. It is possible, however, that it represents the very bottom part of Feature 1 (a surface fire-cracked rock concentration) or perhaps materials displaced downward from Feature 1 by rodents although there is no obvious connection between the two features. No artifacts were found in direct association with Feature 2.

Feature 5 (Unit 2; N122/W95)

Feature 5 is a dense oval concentration (1.10x0.90 m) of well-fractured rocks covering an area of 0.98 m² (Fig. 26). Some rocks apparently displaced from the feature

KEYSTONE DAM PROJECT

UNIT 2 CROSS SECTIONS

ZONES OF FIRE-CRACKED ROCKS

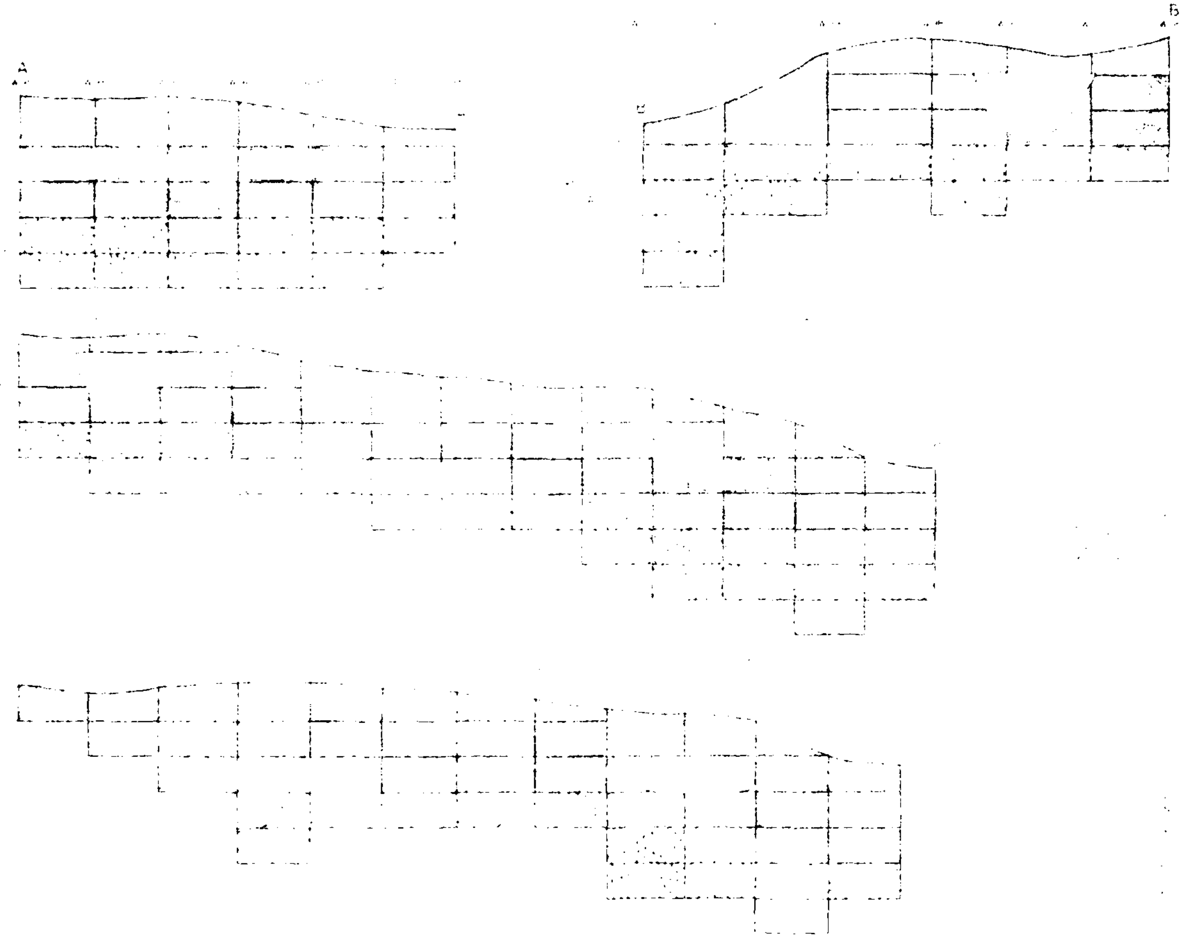


Figure 25

TABLE 8

SUMMARY OF DESCRIPTIVE DATA FOR FIRE-CRACKED ROCK CONCENTRATIONS IN BLOCK EXCAVATION UNITS

Feature Number	Dimensions (m)	Area (m^2)	Weight of FCR* (kg)	Number of FCR	% Limestone (by #)	Kg/pc	Wt/m^2	#/m^2
2	-	-	-	-	-	-		-
5**	1.10x0.90 (1.50x1.30)	0.98 (1.29)	110.0	329	76	0.33	[illegible]	255.0
17**	0.75x0.50 (1.00x0.70)	0.34 (0.68)	35.3	36	nda	0.98		52.9
21	1.50x1.60	2.02	176.6	146	95	1.21	87.4	72.3
27	0.80x0.80	0.47	51.5	134	66	0.38	109.6	285.1
31	1.15x1.15	1.18	49.1	143	96	0.34	41.6	121.2
32	1.90x1.90	2.60	414.7	1709	75	0.24	159.5	657.3
33	0.40x0.40	0.16	16.7	46	63	0.36	104.4	287.5
mean	1.06	1.11	122.00	363.29	78.5	0.55	91.4	247.3
standard deviation	0.45	0.91	139.89	601.14	14.1	0.38	39.2	206.4

*FCR = fire-cracked rocks.

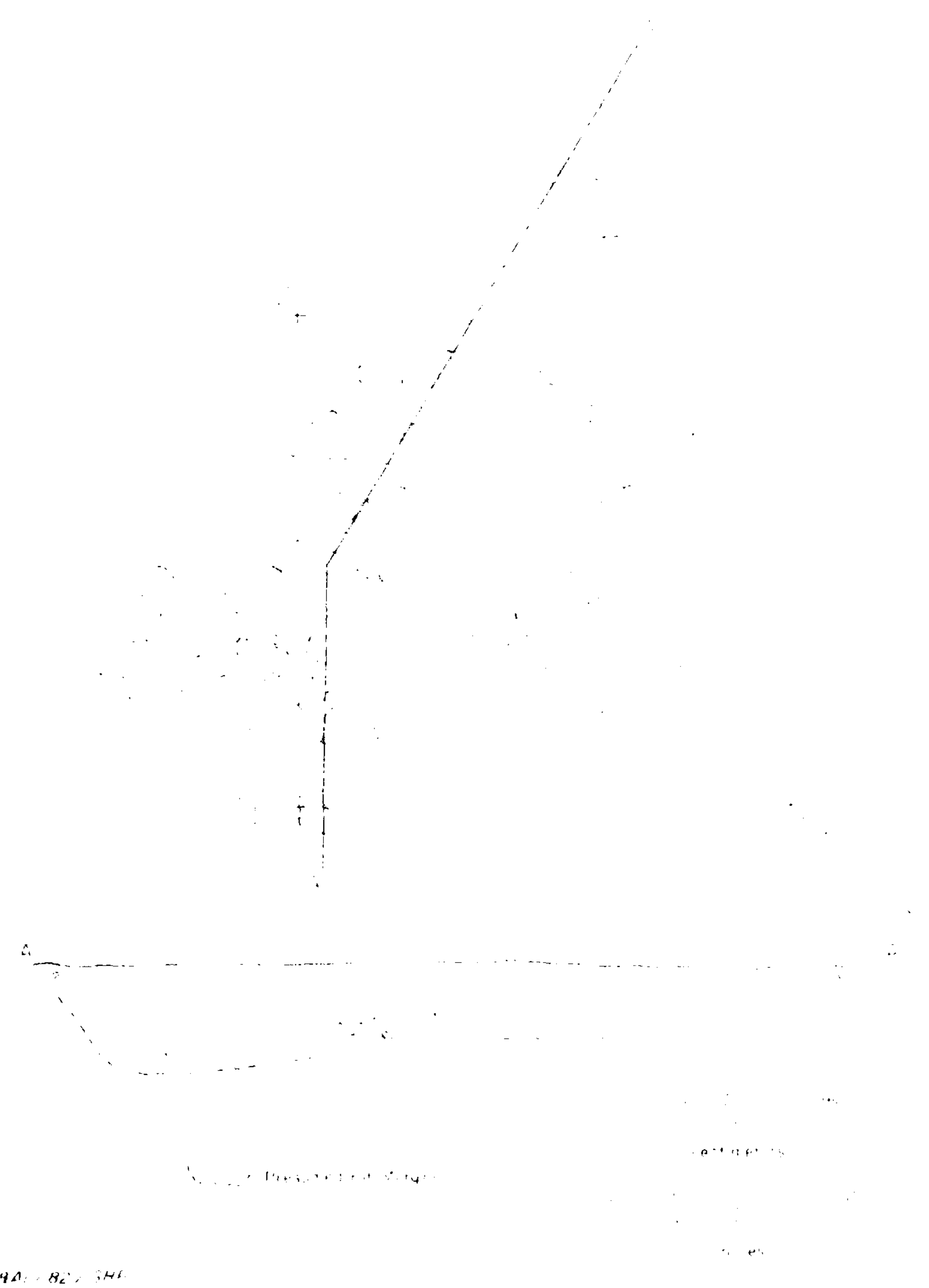
**Dimension and area figures not in parentheses are for central parts of the features. Those in parentheses are for central parts plus surrounding displaced scatters. Weight and number densities have been calculated using the larger area figures.

occur around the main concentration and cover an additional area of 0.31 m^2 (overall dimensions = 1.5x1.3 m). The rocks are arranged roughly in a three-sided ring around the central and south-central parts of the feature where rocks are absent. The 10-cm-thick rock concentration appears to be within a shallow basin-shaped pit, but the fill around the rocks is no different from fill outside of the feature, and thus the feature margins are defined solely on the basis of the extent of the rock concentration. An area containing discontinuous patches of light-gray-stained sand but lacki[illegible] [illegible]harcoal inclusions occurs just beneath the rocks in the central part of the feature. [illegible] likely represents downward migration of charcoal staining from the feature. Since [illegible] does not contain

KEYSTONE DAM PROJECT

FEATURE 5

PLAN MAP & CROSS SECTION



distinctive fill, the level of origin for this feature remains unknown. The top of the feature, however, is 5-10 cm below the modern ground surface, and it is probable that the pit was dug from a surface very near or slightly lower than the modern surface. Based on the vertical position and the presence of the shallowly buried high density rock scatter in adjacent units, Feature [illegible] is assessed as belonging with the middle zone in Unit [illegible].

Feature 17 (Unit [illegible]; N80/W90)

Feature 17 is a small, oval concentration ([illegible]x50 cm) of little-fractured rocks within an area of 0.34 m^2 (Fig. 27a). An additional 0.34-m^2 area around this dense concentration contains rocks apparently displaced from the feature (overall dimensions = [illegible] m). The top of this 15-cm-thick concentration is about 10-15 cm below ground surface. No differences can be seen between the fill around the rocks and the fill outside the feature, and thus the feature margins are defined as the limits of the rock concentration. The lack of a distinctive fill precludes a determination of whether or not Feature 17 is within a pit. Further, the rocks at the base of the feature are all at very nearly the same elevation and do not show any upward basining toward the feature edges. Although the level of origin for this feature remains unknown, it appears to belong with the dense rock scatter in Unit 1.

Feature 21 (Unit [illegible]; N100/W98)

Feature 21 is a large, roughly circular concentration (diameter = 1.60 m) of little-fractured rocks covering an area of 2.02 m^2 (Figs. 27b and 28). The rocks occur in a single, somewhat jumbled layer and are conspicuously absent in the west-central and northwestern parts of the feature. The top of this 10-cm-thick concentration is at about 15 cm below modern ground surface. No differences between the fill around the rocks and the fill outside of the feature can be seen, and the feature margins are defined as the limits of the rock concentration. It cannot be determined whether or not the rock concentration is within a pit, but the rocks at the base of the feature do show slight upward basining at the feature edges.

Just below the rocks in the north-central part of the feature is a small (ca. 60x45-cm) area with gray-stained soil and containing some woody charcoal. Although obviously disturbed by animal burrowing, this stained area with charcoal is interpreted as representing the remnants of the very bottom part of Feature 21 or, perhaps just as likely, material transported downward from Feature 21 by animals. In any case, this charcoal is interpreted as a by-product of the use of Feature 21. A radiocarbon date of A.D. 520 ± 70 for this charcoal suggests strongly that Feature 21 resulted from a Mesilla Phase occupation of the site and, as noted earlier in this chapter, forms a part of the basis for postulating that Features 21 and 31, along with the heavy rock scatter surrounding them, postdate by a considerable amount of time the continuous dense rock scatter designated as Feature 2[illegible].

Feature 27 (Unit 2; N115/W100)

Feature 27 is a small (80 cm in diameter), circular, basin-shaped pit (maximum depth [illegible] cm) containing densely packed fire-cracked rocks (Figs. 29 and 30a). The top of this feature is about 2[illegible] cm below the modern ground surface. The rocks do not appear to have been arranged horizontally or vertically in any organized way; rather, they seem just to have been packed into the pit. The pit margins are easily delineated as the limits of the

rocks and darkly stained fill. The edges of the pit show no signs of having been oxidized by burning. The fill surrounding the rocks is much grayer than the surrounding soil and contains numerous flecks and chunks of woody charcoal. A radiocarbon assay of this charcoal yielded a date of 2160 ± 160 B.

Lying next to the feature and at the same level as the top of the rocks and the darkly stained fill is a large (35x20x10-cm), unfractured limestone cobble. This cobble may well have been used with Feature 27 (e.g., as a support for something being suspended over the hearth or as a working surface for activities being performed next to the hearth), and marks with relative certainty the level of origin for this feature (at 25 cm below the present ground surface). Feature 27 is interpreted as possibly belonging with the lower zone defined in Unit 2 based on the fact that Feature 20 (the high density rock scatter) occurs higher than the Feature 27 level of origin to the north and east of the feature and occurs at a comparable elevation only to the south of the hearth (information on relationships to the west was destroyed by Backhoe Trench A). While this evidence is far from conclusive, it is apparent that Feature 27 belongs with an occupation which either predates Feature 20 or relates to the initial stage of the accumulation of Feature 20. In either case, the date from Feature 27 can be seen as providing an approximate early limit for the accumulation of the dense middle fire-cracked rock zone in Unit 2.

Feature 31 (Unit 2; N109/W96)

Feature 31 is a circular concentration (diameter = 1.35 m) of well-fractured rocks covering an area of 1.18 m^2 (Figs. 20b and 31). The top of this 10-cm-thick concentration is 8-13 cm below the ground surface. The rocks generally occur in a single layer and evenly across all but the west-central part of the feature where rocks are absent. The fill around the rocks is, in places, slightly grayer than the fill outside the feature, but as a whole the feature fill is indistinguishable from the surrounding soil. The feature limits are defined on the basis of the extent of the rock concentration. It cannot be determined if the rocks are within a pit because of the lack of distinctive fill, and the rocks at the base of the feature show no tendency to basin upwards at the feature edges.

Feature 31 is interpreted as belonging with Feature 21 and the upper zone defined in Unit 2. This tentative assessment is based on: (1) the identical vertical positions of Features 21 and 31; (2) the location of Feature 31 above the major part of the dense rock scatter in this part of Unit 2; and (3) the anomalous occurrence of a high burned rock density above the feature which suggests that the concentration is within a pit originating from a surface near the present ground surface. Of course, precise contemporaneity with Feature 21 cannot be established, but it does appear that both features were used after the accumulation of Feature 20.

Feature 32 (Unit 2; N117/W97)

Feature 32 is a large (diameter = 1.90 m), circular, basin-shaped pit (maximum depth 20 cm) containing densely packed fire-cracked rocks (Fig. 32). The top of this feature is about 5 cm below the modern ground surface. Although the rocks occur in more than a single layer, they do not appear to have been arranged in a formal manner. The pit margins are partially disturbed by animal burrowing but are easily defined on the basis of the extent of rocks and darkly-stained fill. The pit edges show no signs of oxidation. The fill surrounding the rocks is very darkly stained and contains numerous flecks and

Figure 27. Features 17 and 21.

a. Vertical view of Feature 17 partly exposed; note unfractured rocks (arrow to north; scale in centimeters and inches).

b. View to west of Feature 21; note unfractured rocks (scale in centimeters and inches).

Figure 27

a

b

Figure 28

KEYSTONE DAM PROJECT
FEATURE 21
PLAN MAP

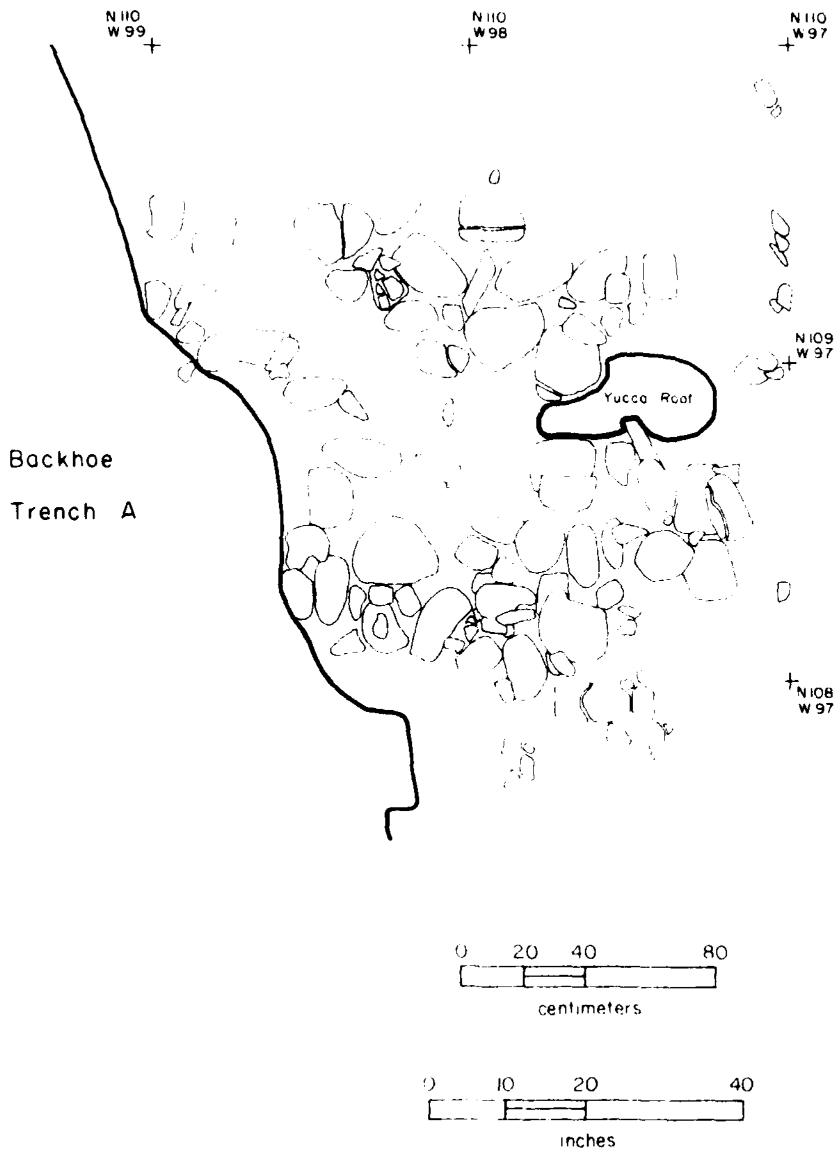


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Figure 29

KEYSTONE DAM PROJECT
FEATURE 27
PLAN MAP & CROSS SECTION

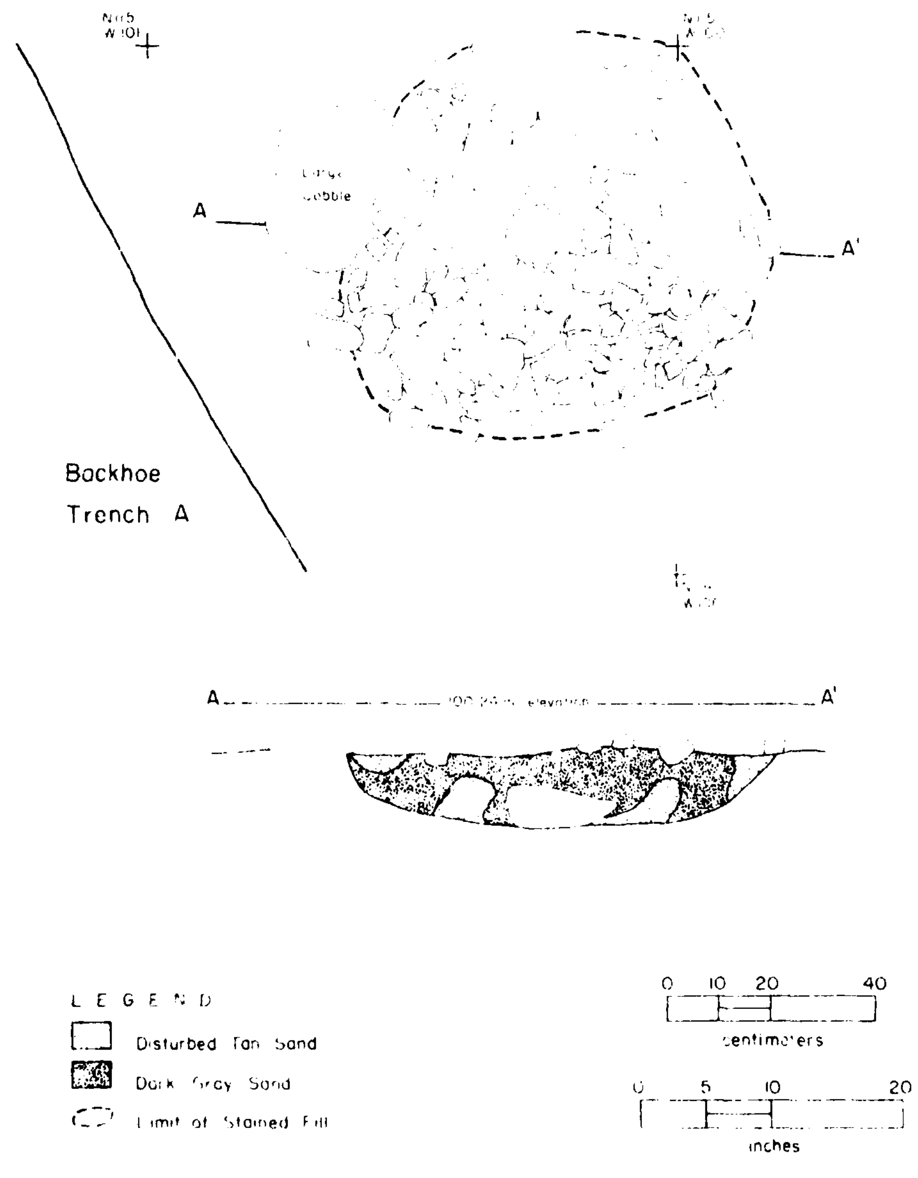
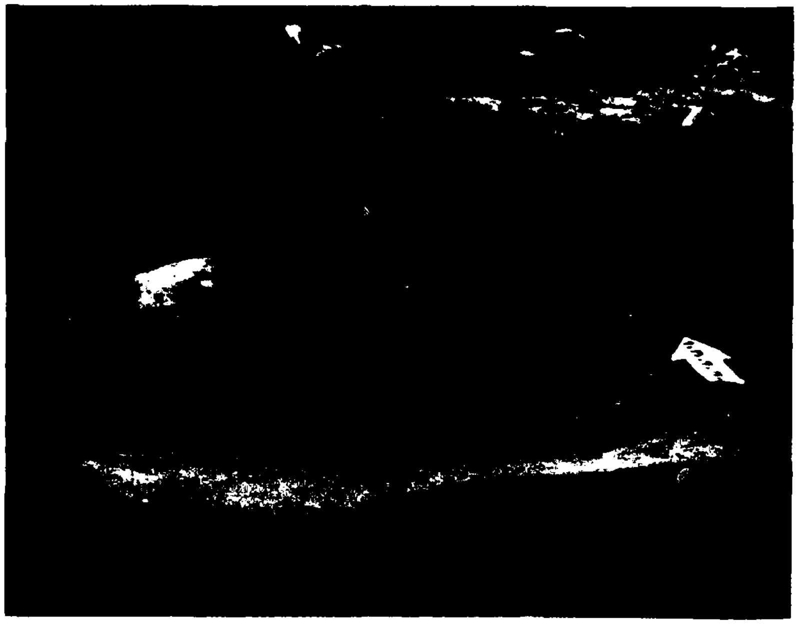


Figure 30. Features 27 and 31.

a. View to the north of Feature 27 after cross sectioning; note large cobble lying next to feature (scale in centimeters and inches).

b. View to the west of Feature 31; note fire-cracked rocks and mano in the wall beneath the feature (scale in centimeters and inches).

Figure 30



a

b

chunks of woody charcoal. A radiocarbon assay on a sample of this charcoal yielded a date of 650 B.C. ± 120.

The distinctness of the Feature 32 fill enables a fairly confident identification of the approximate level from which this pit was dug (at about 5 cm below surface). Figure 25 shows clearly that Feature 32 cannot date any earlier than the late stages of the accumulation of Feature 20. Thus the 650 B.C. date provides an approximate late limit for the accumulation of the dense rock zone in Unit 2.

Feature 32 was unusual in that it contained a large number of chipped stone artifacts (114 unmodified flakes, chips and angular fragments; 16 unmodified cores; 9 edge-modified flakes; and 5 edge-modified cores). Some of the cores were blackened and may have been included as hearth materials during feature use. Most of the specimens, however, did not appear burned and were probably dumped in the feature after it was used.

Feature 33 (Unit 1; N80/W94)

Feature 33 is a small (diameter = 40 cm), circular fire-cracked rock concentration covering an area of 0.16 m² (Figs. 33 and 34b). The top of this 10-cm-thick concentration is 20-25 cm below the modern ground surface. The rocks occur in a single layer and are not arranged in any particular way. The fill around the rocks is indistinguishable from fill surrounding the feature, and thus it cannot be determined whether or not the rock concentration is within a pit. The rocks in the feature do not basin upwards at the feature edges.

Feature 33 is surrounded by the lower part of the dense rock scatter (Feature 3) in Unit 1 and is interpreted to belong with the lower zone defined in this part of the site.

GRAY-STAINED SOIL LENSES

This group is composed of three feature numbers assigned to relatively discrete gray-stained soil lenses found in Unit 1. While these stained areas are generally discrete horizontally, the staining is extremely diffuse and difficult to follow both horizontally and vertically. These three features are interpreted as probably representing the locations of destroyed hearths.

Feature 29 (Unit 1; N76/W93)

Feature 29 was first detected at 2 cm below the modern ground surface and covered an area 2.25 m east-west by at least 1.76 m north-south (the stain was not fully exposed to the south). The darkest part of this stain occurred in the south-central part of the feature, and it is this area that is shown as Feature 29 on Figure 20. Extensive cross sectioning efforts revealed that this stain extended downwards about 53 cm, all the way to the basal gravels, and that the horizontal dimensions remained roughly the same as those first defined. It was never possible, however, to clearly define any of the edges of the feature, and it is very likely that the dimensions given do not reflect the total dimensions of whatever cultural phenomenon this stain represents. That this stain is so diffuse and occurs over such a large area and a great vertical distance suggests that there has been considerable movement of the staining agent (i.e., charcoal or ash) from its original location.

Figure 31

KEYSTONE DAM PROJECT

FEATURE 31

PLAN MAP

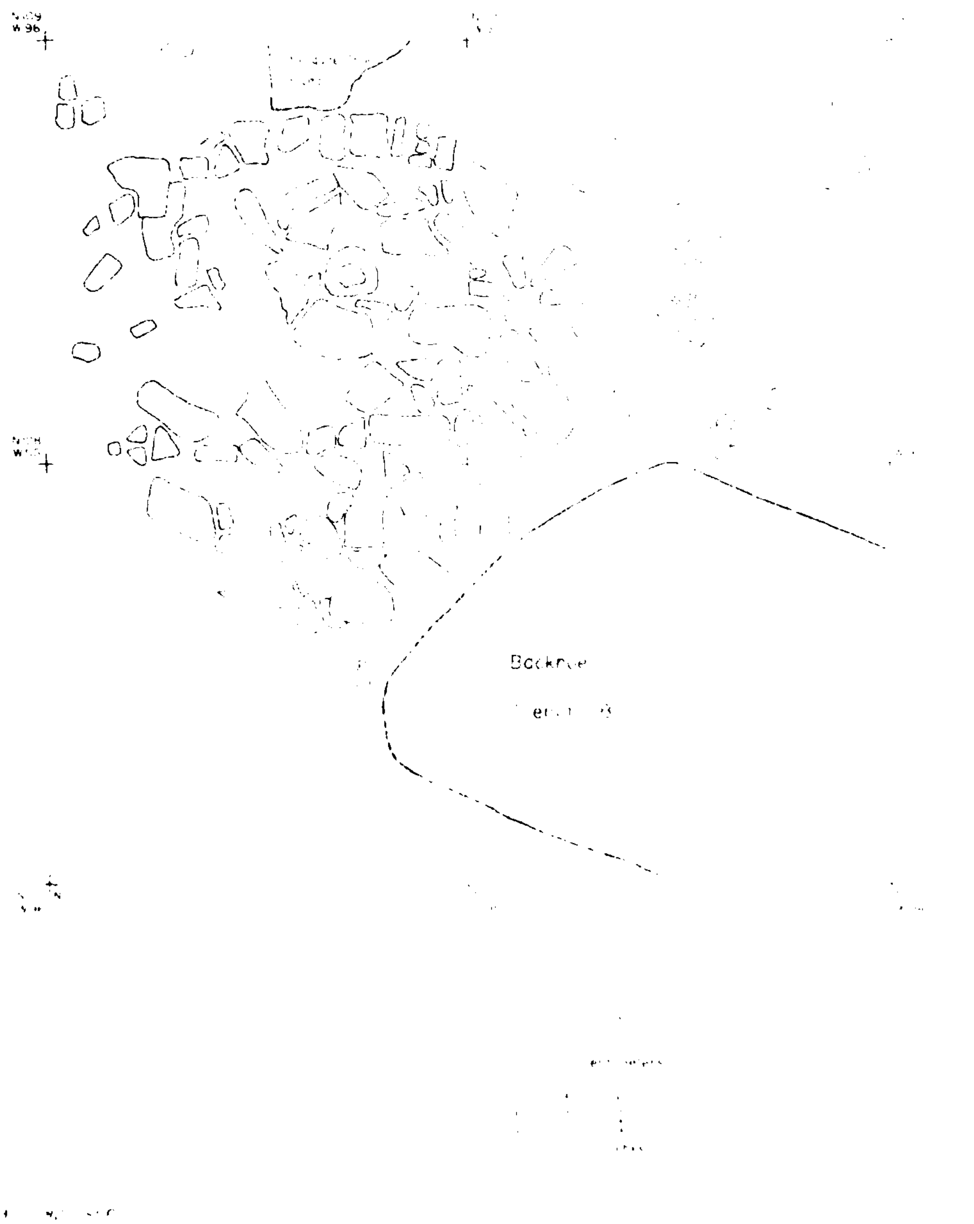


Figure 32. Feature 32.

a. View to the south of Feature 32 fully exposed (scale in centimeters and inches).

b. View to the east of Feature 32 after cross sectioning.

Figure 32

a

b

The occurrence of the top of this stain at just 2 cm below the present ground surface suggests that whatever this feature represents occurred on a surface very near the modern ground surface and that Feature 29 thus belongs with the upper zone defined in Unit 1.

Feature 30 (Unit 1; N79/W94)

Feature 30 is a stain covering an irregular area about 75 cm in diameter and 5 cm vertically. The top of the stain is at about 25 cm below the present ground surface. The stain is very diffuse, and its limits are not at all clear.

This stain was detected within the zone of high burned rock densities, and it is likely that, if Feature 30 does represent a localized area of burning, this now-destroyed hearth belongs with the lower zone defined in Unit 1.

Feature 34 (Unit 1; N84/W98)

Feature 34 is a roughly semicircular stain (not fully exposed to the west) covering an area about 1.0 m by 0.50 m. It was encountered at approximately 25 cm below ground surface and extended about 26 cm below the detection level. The stain is quite diffuse, and its limits are not clear.

As with Feature 30, the detection level for this stain suggests that whatever cultural activity the stain represents occurred during the accumulation of Feature 3 and thus belongs with the lower zone defined in Unit 1.

PIT

A single feature, Feature 18, is included here.

Feature 18 (Unit 1; N85/W91)

Feature 18 was first detected in the west wall of Backhoe Trench A as an 80x20-cm lens of gray-stained sand at about 30 cm below the modern ground surface. Further investigation showed that Feature 18 is the western part (ca. one-third?) of a large vertical-walled pit, most of which was removed during Backhoe Trench A excavation. This remaining part is about 1.5 m northwest-southeast by 0.40 m northeast-southwest. Based on the curvature of the west wall of Feature 18, the width of Backhoe Trench A, and the fact that Feature 18 does not occur in the east wall of the trench, it is assumed that the Feature 18 pit was oval to round and had maximum horizontal dimensions of ca. 2.0x2.0 m.

The western pit margin is clearly definable on the basis of color and compaction differences (pit fill is grayer and more compact than outside fill) just below the loose, recently accumulated sand on the site surface, and thus the pit seems to have been dug from a surface very near the present ground surface. The pit reaches a maximum depth of 56 cm and has a nearly level bottom. The steepness of the western pit wall (essentially vertical) is curious in view of the nature of the site deposits and suggests strongly that the pit was filled rapidly (possibly intentionally) after use.

The function of this pit remains problematical. The presence of charcoal-stained fill and a relatively large amount of fractured rocks in the uppermost level suggests that

Figure 33

KEYSTONE DAM PROJECT

FEATURE 33

PLAN MAP

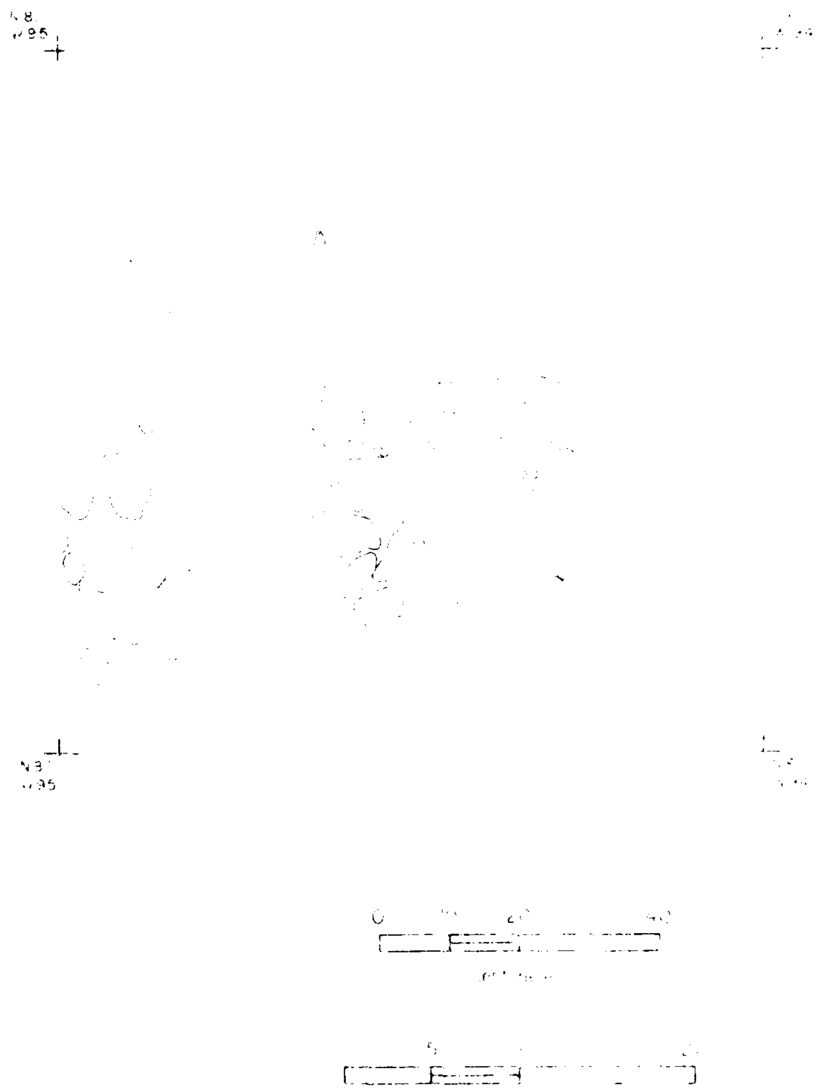


Figure 44. Features 8 and 33.

a. Vertical view of Feature 8 fully exposed and pedestaled; note large rocks fractured in place (arrow to north; scale in centimeters and inches).

b. View to the north of Feature 33 (right center) and surrounding fire-cracked rocks (scale in centimeters and inches).

Figure 34

a

b

the pit may have been used as some sort of hearth. On the other hand, the fractured rock is not radically more abundant here than elsewhere in Unit 1, and the shape and size of Feature 18 certainly do not compare with those for known hearths at Site 32.

DISCUSSION OF SUBSURFACE FEATURES

The evidence for subsurface features in the block excavations at Site 32 consists of eight rock concentrations interpreted as intact or nearly intact hearths (six in Unit 2, two in Unit 1), three areas with gray-stained soil interpreted as loci of destroyed hearths (all three in Unit 1), one pit of unknown function (in Unit 1), and in each unit a continuous but dispersed scatter of fractured rocks interpreted as hearth debris. Based on the vertical distributions of the features and the dispersed rock scatters, two vertically distinct zones are defined in Unit 1 and three in Unit 2 (Unit 3 is not considered here since it is so small). Absolute dates are available only for Unit 2, but it is assumed that the main part of the dispersed rock scatter in Unit 1 (the lower zone) accumulated at roughly the same time as that in Unit 2 (the middle zone).

The disparity in the numbers of hearths in Units 1 and 2 would seem to suggest more intensive use of Unit 2; however, this assessment is belied by the higher density of dispersed rocks (see Table 7) and the much higher density of artifacts (see Chapter XI) in Unit 1. An alternative explanation for the scarcity of intact hearths in Unit 1 is that this part of the site was used relatively intensively and that this use resulted in increased dismantling of hearths for the reuse of rocks, and in more frequent incidental destruction of hearths due to pedestrian traffic. Another explanation is that the units are too limited in extent to be truly representative of the areas they sample in terms of feature distributions and densities.

Table 7 shows that while the density of dispersed rock is somewhat greater in Unit 1 than Unit 2, the overall densities in the three block units are quite comparable. This seems to suggest a rather remarkable degree of homogeneity in terms of intensity and/or length of occupation for the parts of the site sampled by the block units.

The third column in Table 7 shows that, overall, the rocks in the dispersed scatter in Unit 1 are larger (i.e., greater weight per piece) than those in Unit 2. This suggests that the dispersed rocks in Unit 2 may have generally seen more reuse than those in Unit 1 (assuming that reuse results in increased breakage); but this interpretation contradicts the interpretation offered above that the scarcity of intact hearths in Unit 1 is due to a higher incidence there of hearth dismantling for rock reuse. In short, these differences in rock size hint at some difference in the extent of rock reuse, but the evidence is too equivocal for a definitive statement.

Throughout this chapter, it has been reasonably assumed that the dispersed rock scatters represent hearth debris. There has not been any mention, however, of whether this debris represents materials removed from hearths and dumped or whether the debris represents highly disturbed but still essentially in situ hearth remnants. It is likely, of course, that both kinds of situations exist. One of the emphases of this study has been to try to ferret out the effects of these two factors.

The first step in exploring this question, after defining the vertical zones, was to plot densities of fractured rocks per 1x1-m square for each zone. Weight, rather than

numbers are used for this because it is felt that weight more accurately reflects the overall quantity of rocks present. While these density plans (Figs. 35 and 36) may be useful in that they reflect the general intensity of some kinds of activities (i.e., dumping of hearth debris and displacing of hearth debris), they obviously do not allow the isolation of the different kinds of activities. For this purpose, it was decided to examine the horizontal distribution of another measure, mean weight per piece of fractured rock. The possible utility of this measure of rock size was suggested by the fact that the average weight per piece for rocks from the seven intact hearths ($\bar{x}$ = 0.55 kg/piece, s = 0.38) is substantially larger than those for the dispersed rocks in Units 1 and 2 (0.1[illegible] kg/piece and 0.12 kg/piece). Although this figure for the intact hearths is inflated by the values for the two unusual hearths with little-fractured rocks (Features 17 and 21), a revised mean weight per piece for the other five hearths ($\bar{x}$ = 0.33 kg/piece, s = 0.0[illegible]) is still considerably higher than the values for the dispersed scatters. Thus, it was reasoned that horizontal clusters of relatively large rocks might tend to reflect disturbed hearths (or possibly rocks intended for hearth use) rather than materials removed from hearths and discarded.

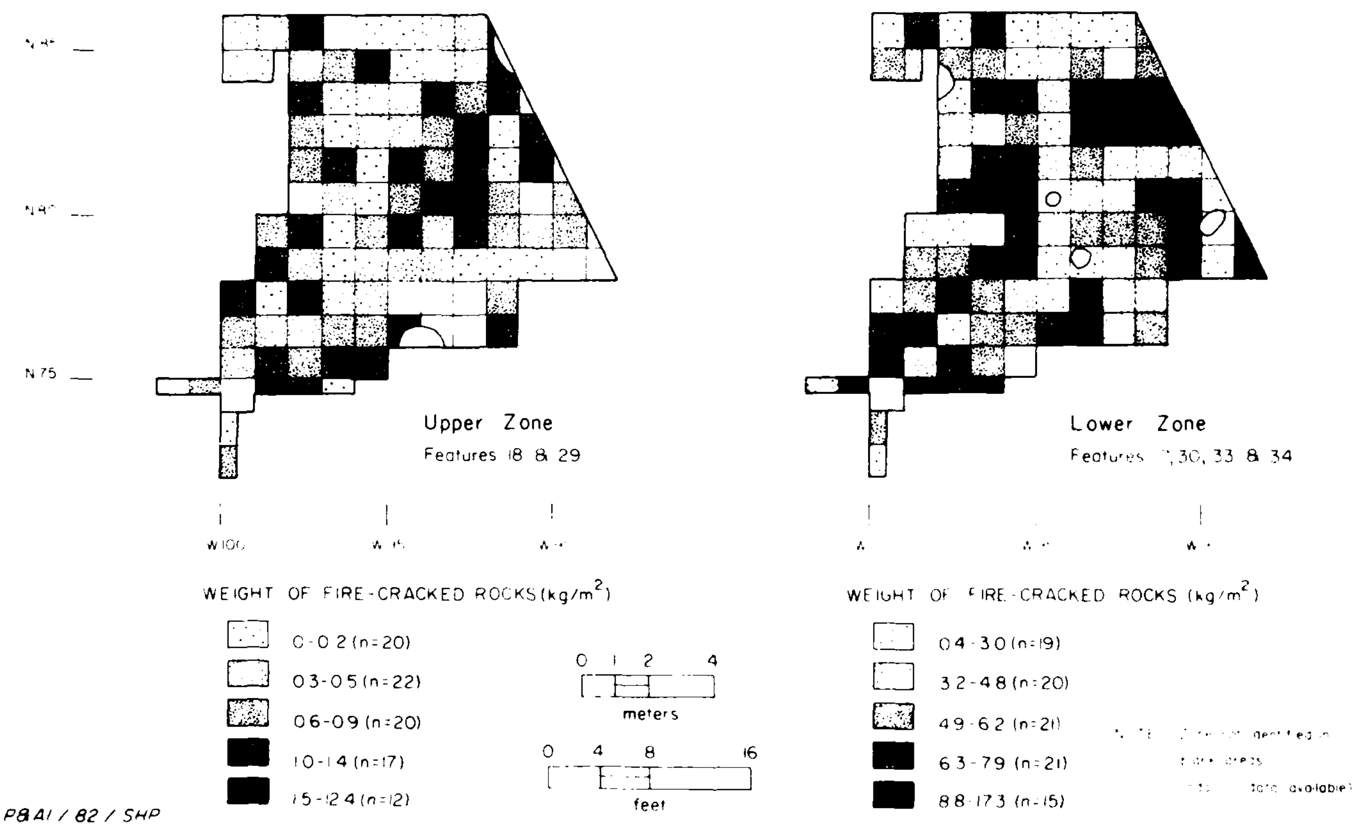
In comparing the distributions of mean rock weight per square and mean weight per piece of rock, it became apparent that this line of reasoning still had one major flaw -- that a high weight per square could be caused by just a few large rocks. Obviously the presence of a few large rocks in a 1x1-m square would not be sufficient to suggest the presence of a disturbed hearth. Thus, these distributions were compared to a third, the distribution of rocks by number, to try to isolate squares with a relatively large quantity (as measured by both weight and number) of relatively large rocks (as measured by weight per piece of rock).

Figures 37 and 38 show, by zone, squares which have shared higher than average values for all three measures and squares with shared high values for only weight per square and weight per piece. Where isolated squares with shared high values occur (as for the upper zone of Unit 1), it is quite difficult to assign cultural significance. This is especially true where the fractured rock scatter is of low density and widely dispersed. But, where squares with the three shared high values cluster with other squares with either three high values or even just two (since these could be reflecting marginal parts of disturbed hearths), it is much easier to argue that disturbed hearths are represented indeed. Some of these clusters of squares occur close to known hearths and may represent disturbed parts of those hearths. This could be the case with: (1) part of the cluster just west of Feature 17 in the lower zone of Unit 1; (2) the cluster around Features 21 and 31 in the Unit 2 upper zone; and (3) the cluster around Features 2 and [illegible] in the Unit [illegible] middle zone.

Other concentrations which may represent heavily disturbed hearths occur: (1) in the Unit 1 upper zone near Feature 18; (2) west of Feature 17 in the Unit 1 lower zone (this cluster seems too large to represent only disturbed parts of Feature 17); (3) in the northeastern part of the Unit 1 lower zone; (4) in the south-central part of Unit 1 around Feature 29 (this may be associated with Feature 29 and belong with the upper zone); (5) west of Feature 30 in the Unit 1 lower zone; (6) in the southern portion of the Unit 2 middle zone, just west of and beneath Feature 31; (7) in the Unit 2 middle zone north of Feature 21; and (8) at the south end of the Unit 2 lower zone (this was identified in the field as Feature 28, a dispersed scatter).

Figure 35

KEYSTONE DAM PROJECT
UNIT I
DISTRIBUTION OF FIRE-CRACKED ROCKS



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KEYSTONE DAM PROJECT

UNIT 2

DISTRIBUTION OF FIRE-CRACKED ROCKS

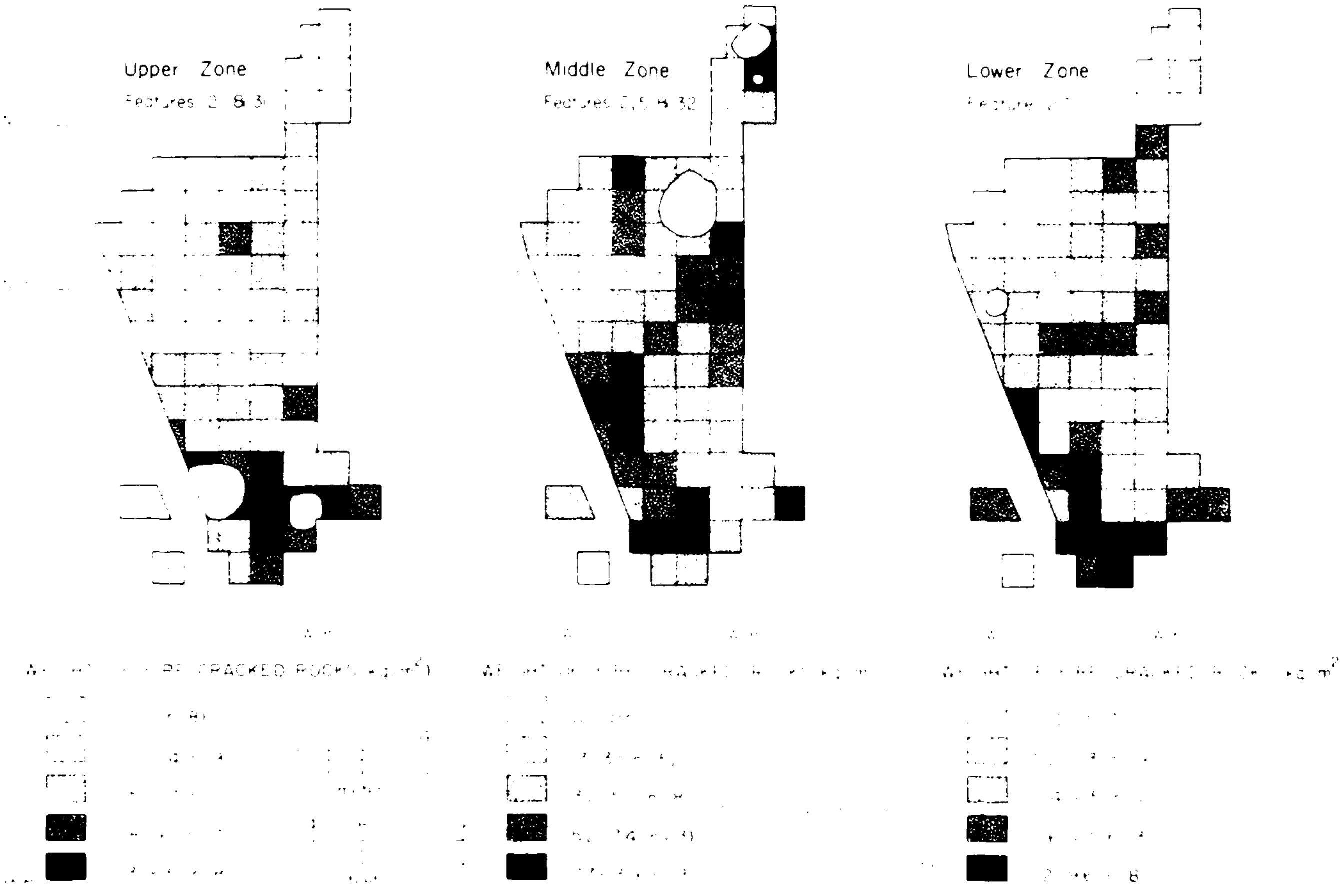
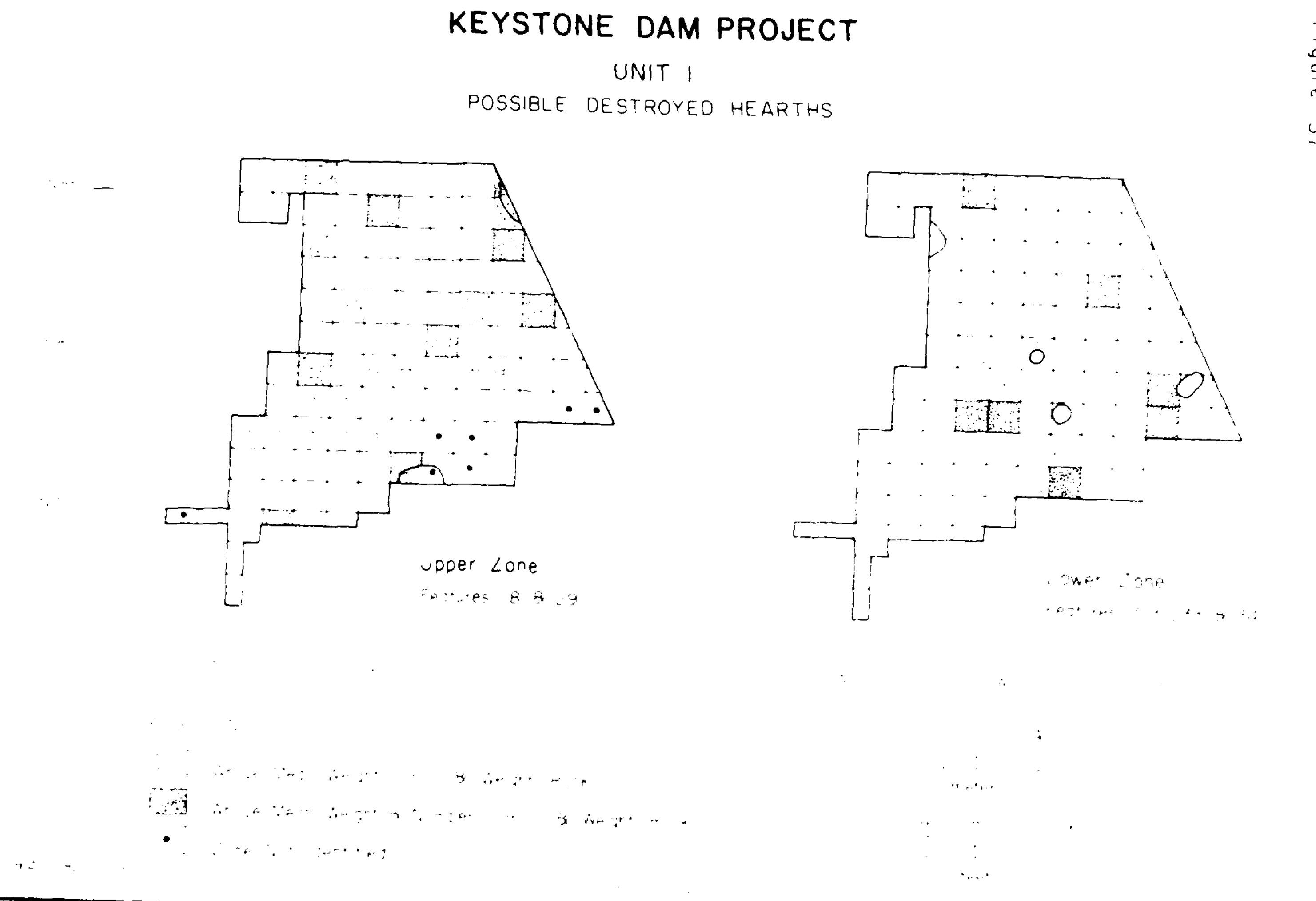


Figure 36

Figure 37



KEYSTONE DAM PROJECT
UNIT I
POSSIBLE DESTROYED HEARTHS
Upper Zone
Lower Zone

KEYSTONE DAM PROJECT

UNIT 2

POSSIBLE DESTROYED HEARTHS

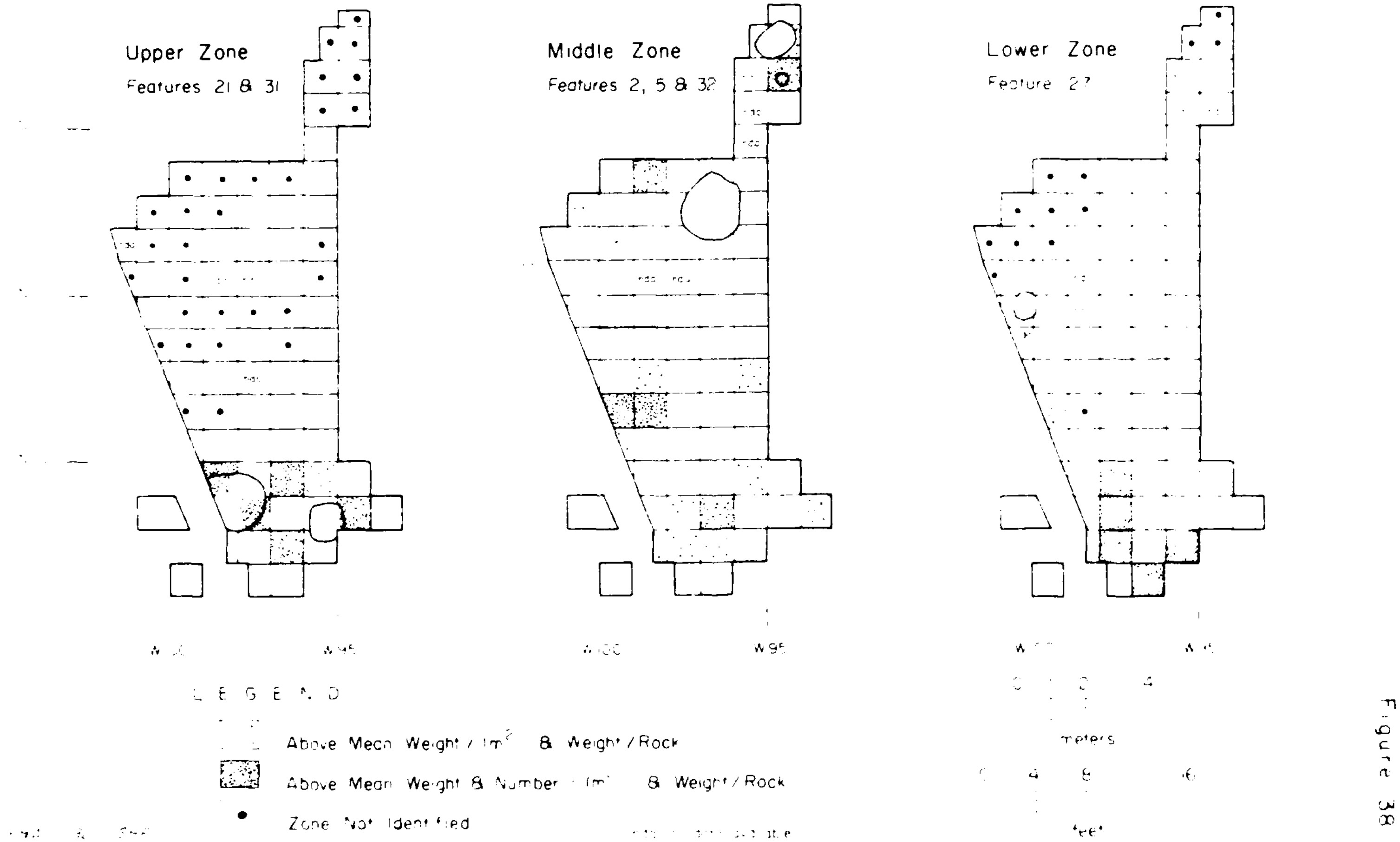


Figure 38

Having identified the areas above as possible hearth loci, it is now possible to compare Figures 35 and 36 with Figures 37 and 38 to isolate which areas have high fire-cracked rock densities but do not appear to represent disturbed hearths (as defined above). These nonhearth areas, which may reflect intensive dumping of exhausted hearth debris, are: (1) west and northwest of Feature 33 in the Unit 1 lower zone; (2) in the southwestern corner of the Unit 1 lower zone; (3) around Features 21 and 31 in the Unit 2 upper zone (although most of the high densities here could be disturbed parts of the two hearths); (4) north of Feature 21 in the Unit 2 middle zone (note that this area also contains a probable destroyed hearth); and (5) southeast of Feature 32 in the Unit 2 middle zone.

Thus, it is proposed here that these dispersed scatters may contain the destroyed but in situ remnants of at least five previously unidentified hearths in Unit 1 and three in Unit 2 as well as areas of intensive dumping of hearth debris. To get an idea of how many hearths could be represented by the total scatter in each unit and thus see how reasonable the estimates of the numbers of destroyed hearths really are, the total weight of the scatter in each unit was divided by the mean weight (84.5 kg) of fire-cracked rocks from five of the intact hearths (the two most extreme cases, Features 32 and [illegible], are excluded). Since these total scatters could contain the discarded remains of hearths outside of the units or of multiple uses of single hearths within the units, as well as the disturbed remnants of in situ hearths, these rough estimates of potential hearths should be larger than the hypothesized numbers of disturbed hearths. That these estimates, 7.5 for Unit 1 and 4.6 for Unit 2, are indeed larger and that they are larger by nearly identical percentages suggest that the numbers of destroyed hearths given here may have some validity.

While this line of inquiry has yielded potentially significant clues as to the context of the dispersed rock scatters, it is emphasized that the possible disturbed hearths were not identified in the field and that the conclusions presented are tentative. In fact, it is somewhat surprising that a culturally significant pattern, such as that proposed here, might be identifiable in thin deposits which represent thousands of years of occupation, such as at Site 32. As a final example of the difficulty of assessing this kind of data, it is sobering to realize that the mean weight of total fire-cracked rocks (from features and from dispersed scatters) from Unit 2 is roughly 2½ times (18.0 kg/m² versus 7.1 kg/m²) greater than that from Unit 1. Thus, while the artifact and dispersed scatter data both indicate that Unit 1 was occupied more intensively or for a longer time than Unit 2, a different picture entirely would emerge if the artifact data were not used and if all of the hearths in both units had been disturbed to the point of appearing only as dispersed scatters.

Feature Functions and Intersite Comparisons

Only one, Feature 18, of the subsurface features found at Site 32 is not obviously a hearth or hearth remnant. Feature 18 is a large vertical-walled pit (2.0x2.0x0.5 m?) which may have been used in pit baking (charcoal-stained fill was present in the pit, and a relatively large amount of scattered fire-cracked rocks occurred in its upper part), but this function is not clearly indicated. Although comparably sized vertical-walled and bell-shaped pits, presumably used for storage, have been found in a number of archeological sites in the region (e.g., Marshall 1973:[illegible]; Wheat 1955:62-65; Sayles 1945:1, 3; Sayles and Antevs 1941:22-23), most of these are in Formative period village contexts.

That Feature 18 does not occur in such a context and that it was dug into very loose sandy soils which probably would not have provided an environment suitable for the storage of perishables argue against a storage function for this feature.

All of the other subsurface features can be interpreted confidently as representing intact hearths, hearth remnants, or destroyed hearths. The seven intact fire-cracked rock concentrations found in the block excavations (see Table 8) show a great deal of variability in diameter (0.40 m - 1.90 m), amount of rocks (16.7 kg - 414.7 kg), density of rocks (41.6 kg/m² - 159.5 kg/m²), and average rock weight (0.[illegible]4 kg/piece - [illegible] kg/piece). Further, only two of these features (Features 27 and 32) show any appreciable charcoal staining. Perhaps these two were more intensively used or less disturbed after use than the others. Also, the relatively dense packing of rocks in these features may have retarded the leaching of charcoal from the fill.

Many fire-cracked rock hearths comparable in size and shape to the Site 32 features have been found at sites in the El Paso area (e.g., Quimby and Brook 1967:32, 34; O'Laughlin and Greiser 1973:17; Lynn 1976:21, 23; O'Laughlin 1979:18-28; O'Laughlin 198[illegible]: 109). Table 9 shows that the Site 32 features are quite comparable to the small fire-cracked rock hearths at Sites 33 and 34 in terms of size but that the average rock weight is much higher for the Site 32 features. That three of the seven Site 32 hearths have rock weights at the extreme upper end of or beyond the range of the rock weights from hearths at Sites 33 and 34 hints that there may be some significant differences between rock hearths at the sites; however, the small number of hearths from both sites and the extremely large ranges in the Site 32 data make further comparisons difficult.

TABLE 9

COMPARISONS OF FIRE-CRACKED ROCK CONCENTRATIONS FROM SITES 33 AND 34 AND SITE 3[illegible]

	Site 32	Sites 33 and 34
Mean Diameter	1.06 m	1.07 m
Range	0.40 - 1.90 m	0.65 - 1.80 m
Number	7	33
Mean Rock Weight	122.0 kg	36.3 kg
Range	16.7 - 414.7 kg	6.9 - 110.8 kg
Number	7	29

In describing the small fire-cracked rock hearths at Sites 33 and 34, O'Laughlin (1980:115-118) identifies four morphological categories based on the arrangement of the rocks: (1) dispersed hearths are the most common and have closely spaced fractured rocks without any obvious formal arrangement; (2) lined hearths have their bases covered with large unfractured cobbles and smaller fractured rocks above and between the cobbles; (3) ringed hearths are similar to dispersed hearths but have a ring of large rocks around the edges; and (4) emptied hearths have only small amounts of fire-cracked rocks in them. The

latter two categories are not conclusively identified in the Site 32 sample (although the gray-stained soil lenses in Unit 1 could represent emptied hearths). The first kind of hearth is present at Site 32 where, like at Sites 33 and 34, it is the most common type. The second group is also represented, but in a somewhat modified form. Specifically, while hearths lined with large cobbles do not appear in the Site 32 sample, there are hearths which contain mostly unfractured or little-fractured cobbles. This distinction between well-fractured and little-fractured hearth rocks is probably more useful, at least for the Site 32 features, than is a distinction based on how the rocks are arranged.

Table [illegible] shows clearly that the mean weights per rock neatly separate the Site 32 hearths into two groups -- Features 17 and [illegible]1 with little-fractured rocks and all others with well-fractured rocks. The interpretation offered here repeats that suggested by O'Laughlin (1980:118) -- hearths with unfractured or little-fractured rocks were relatively little-used (perhaps only once or a few times) or were used in relatively low temperature fires. This hypothetical scenario of initial hearth use involving large, unfractured rocks which are reduced in size with reuse is supported in the archeological literature by Mera's (1938:[illegible]5-19) observations on the accumulation of midden rings in southeastern New Mexico and occasional references (e.g., Quimby and Brock 196[illegible]:[illegible]2) to hearths containing rocks showing various degrees of fracturing. Also, it is reiterated that Feature 8 at Site 32 is a tight concentration (apparently in a pit) of seven limestone cobbles and boulders showing in-situ fracturing but very little rock displacement. Feature 8 appears to be an extreme example (extreme because of the size of the boulders) of large rocks being used once in a hearth.

Having established that the fire-cracked rock concentrations in the Site 32 block excavations are comparable morphologically to rock hearths at other sites in the vicinity, it is appropriate to turn to the major point of interest in this section -- what were these rock hearths used for. O'Laughlin (1980:118-122) summarizes the evidence on the function of fire-cracked rock hearths and concludes that these features, like the large midden rings found widely over the region (e.g., Greer 1968a, 1968b), are special purpose features used in the pit-baking of leaf succulents. This assessment contrasts with that of other researchers (e.g., Wetterstrom 1980:2[illegible]; Whalen 1977:1[illegible]4) who suggest that small rock hearths are general purpose features used for the processing of a variety of botanical and faunal resources as well as for heat.

Unfortunately, interpretable direct evidence on function (in the form of hearth-associated botanical remains) is scarce, and thus the controversy has been debated using ethnographic, morphologic and distributional data. O'Laughlin (1980:118-123) argues his position using a wide variety of kinds of evidence: (1) small hearths resemble ethnographically reported leaf-succulent baking pits; (2) there are no ethnographic descriptions of small rock hearths used as general purpose facilities; (3) charred leaf succulents have been found in small amounts in some excavated hearths, although their absence should not be seen as negative evidence since the baking of the plants would not necessarily result in great quantities of plant debris; (4) rock or caliche hearths are not found ubiquitously in all kinds of sites (e.g., they are not common at sites in the Franklin Mountains or at lowland residential sites); (5) general purpose hearths which do not contain rock or caliche are found in Formative period residential sites; (6) the distribution of sites with rock hearths tends to covary with the distribution of leaf succulents; and (7) hearths lacking fractured rocks have a low archeological visibility. In this thorough review, O'Laughlin convincingly shows the shortcomings of the hearths-as-general-purpose-facilities position -- an argument which is based largely on certain

discrepancies (especially size) between observed hearths and ethnographic accounts (Hard n.d. in O'Laughlin 1980:1[illegible]), the broad distribution of these features (Whalen [illegible]), the scarcity of charred leaf succulents in hearths (Wetterstrom 19[illegible]), a [illegible] established association between some hearths and a broad range of artifact groups (representing multiple functions?) (Whalen 1977:[illegible]4), and the apparent constancy in hearth attributes through time (Whalen 1980:[illegible]). On the other hand, however, O'Laughlin's discussion also clearly demonstrates that the existing data are simply not sufficient to construct a conclusive argument that rock hearths were, in fact, special function features.

The investigations at Site 32 do not add any direct evidence on this question of function. Faunal and macrobotanical remains and pollen were not preserved consistently enough to be useful, and the inability to associate particular artifacts with hearth use renders that line of inquiry tenuous at best. The indirect evidence from the Site 32 features is only a little more useful.

Even if rock hearths could be identified as the only kind of hearth found at Site 32, and this is not the case since the gray-stained soil lenses in Unit 2 could represent disturbed hearths lacking rocks as well as disturbed rock hearths, it could not be stated that rock hearths were the only kind used at the site because of the difficulty of recognizing features in the homogeneous, sandy site soils. Further, although some of the hearths (especially Feature 3[illegible]) seem too large to have served efficiently as general purpose facilities, this is certainly not the case with all or even most of the site examples. In short, the evidence from Site 32, like that from most other sites in the El Paso area, is equivocal on the function of small fire-cracked rock hearths. While these data could be used in arguing both positions, the critical limiting factor seems to be that the Site 32 soils are not conducive to the preservation of all kinds of features present at the site. Thus, it seems that the view obtained archeologically from the Site 32 data is strongly biased against the recognition of features which do not contain a large number of rocks or heavily stained soil. In this regard, it is appropriate to point out here that the Site 32 excavations yielded three items -- a small piece of burned wattle-impressed daub, a calcium-carbonate-cemented mud dauber's nest, and what appears to be a small piece of burned adobe plaster -- which hint at the presence of structures at the site. This meager evidence suggests that features other than hearths may be present.

Chronology and Site Function

Most of the conclusions drawn from the feature data are touched upon earlier in this chapter. This section summarizes these.

Chronology

The vertical distribution of features in Unit 2 allows the definition of three temporally sequential occupational periods in that part of the site. The earliest is represented by the lower zone of fire-cracked rocks (Feature 28) and perhaps Feature 27; the second is represented by the dense middle zone of fire-cracked rocks (Feature 20) and Features 2, 5 and 32; the latest is represented by the low density upper zone of fire-cracked rocks and Features 1, 21 and 31.

The three radiocarbon dates from Unit 2 indicate that the earliest occupational period dates to about 2100 B.C. and before, that the middle period extends from [illegible] B.C. to somewhat later to about [illegible] B.C., and that the latest period runs from [illegible] B.C. to somewhat later than A.D. [illegible]. These dates and the distribution of ceramics show that site [illegible] was occupied primarily during the Archaic and early Formative periods.

The occupational history of Unit 1 is assumed to be similar to that of Unit 2 because of the similar vertical distribution of the fire-cracked rock scatter; but the lack of ceramics in Unit 1 indicates that occupation in the southern part of the site occurred only during the Archaic.

While these data are used to divide the occupational history into various periods, they are not very helpful in subdividing each period into discrete occupational episodes. The thickness of the deposits containing the cultural material, the radiocarbon dates, and the occurrence in at least one 1x1-m square of two to four lenses of fractured rock within one zone very clearly suggest that each zone represents repeated rather than single occupations. The inability to isolate individual occupations remains a problem in this analysis since it is quite difficult to discuss the use of space at a given time in the site's history.

Site Function

Given the poor preservation of pollen, macrobotanical and faunal remains and the difficulty of associating artifacts with feature use, most of the clues presented here regarding site function come from the distribution and morphology of features. While the very limited range of feature types found suggests a limited range of site activities, it is stressed that the site soils are not conducive to the preservation of all kinds of features. Further, the function of fire-cracked rock hearths in the project area cannot be demonstrated even though a great deal of effort has been expended in trying to do so.

The Site 32 features do not add any direct evidence to this controversy over hearth function; but it is suggested here that, even if the hearths were used for the processing of a particular resource (i.e., leaf succulents), they do not reflect very intensive exploitation of that resource. This conclusion is based on the size of these features. Only one, Feature 32, is large enough to suggest anything more than small-scale processing, and none even approaches the sizes of known midden rings, which most closely resemble ethnographic descriptions of agave roasting pits, in the El Paso area.

The most important information on site function to come from the analysis arises from the observation that the latest deposits (the upper zones) contain much less scattered fire-cracked rocks than do the deposits which date between about 2100 B.C. and [illegible] B.C. As discussed in Chapter XI, this fact, coupled with the occurrence of comparable debitage densities between the two occupational periods which hints at comparable intensities of occupation, suggest that fire-cracked rock hearths were used much less frequently during the terminal Archaic than before. Consequently, it is concluded that there was a shift in the kinds of activities which were taking place at the site and that this shift may indicate significant changes in subsistence practices and settlement systems. These data may indicate that rock hearths were indeed special function features since it does not seem likely that general purpose hearths changed very drastically in morphology during the middle to late Archaic.

CHAPTER VII

CHIPPED STONE ARTIFACTS

The purpose of this chapter is to describe the collection of chipped stone artifacts and to address several questions concerning the manufacture and utilization of the tools. The chapter contains three major sections: description of the collection, manufacturing technology, and tool function. A discussion of the utility of each of the artifact samples recovered during the Site 32 investigations precedes these sections.

Discussion of the Artifact Samples

In Chapter V, the rationale for the manner in which the field investigations were carried out is presented. Five distinct artifact collections have been recovered: (1) artifacts collected from the surface; (2) artifacts from systematic sample excavations; (3) artifacts from block excavation units; (4) artifacts from trenching of surface features; and (5) artifacts from Phase I test pits. Each of these collections constitutes a sample of the total population of artifacts actually present in the Site 32 deposits. Each sample is biased in a different manner, and each has different strengths and weaknesses for use in the artifact analyses.

Surface Collection

As stated in Chapter V, the primary purpose of the surface collection was to delimit areas of relatively intensive occupation to guide the placement of block excavation units. The artifacts recovered from the collection are useful for viewing broad spatial patterning of cultural materials at the site but cannot be considered representative of the range and relative abundance of artifacts in the site as a whole. It is likely that debris from most occupations occurs on the surface. However, material from the more recent occupations most likely is over-represented, especially in the central portions of the site where the thick sand mantle covers earlier materials. As discussed in Chapter VI, the surface distribution of fire-cracked rocks suggests that thin or deflated deposits, especially in the northern portions of the site, have resulted in exposure of mixed materials from several occupations.

Systematic Sample Excavations

In addition to their use as a guide to the placement of block excavation units, the systematic sample units were intended as a method of probabilistic sampling of the total population of artifacts at Site 32. A systematic sample rather than a simple random sample was employed in order to insure a more even spatial coverage across the site. Systematic samples have been shown to provide accurate estimates of total population values when spatial patterning of artifacts does not conform to the patterning of sample units (Redman 1975:150). There is no reason to believe that these patterns are similar at Site 32.

[illegible] of this sample stems from the fact that: (1) probabilistic samples [illegible] the chance of discovering the range of spatially restricted activities carried [illegible] the site (Asch 1975:1[illegible]); and (2) the relative proportions of artifacts [illegible] [illegible] the sample can be evaluated [illegible] as to their representativeness of [illegible] artifacts present in the site deposits.

[illegible]pretation of any probabilistic sample must take into account that the archeolo[illegible] record does not consist of the complete inventory of material remains of any given [illegible]. The record is in itself a sample and not a sample that is representative of [illegible] cultural inventory (Schiffer 1972, 197[illegible]; Collins 1975; Reid et al. 1975).

[illegible] focuses on analysis of the site as a single unit of study; intrasite [illegible] treated only in a descriptive manner. Because the total population of arti[illegible] interest, data from the systematic sample units are emphasized. This infor[illegible] intended for intersite comparisons concerning general, long-term spatial and [illegible] variability of artifact assemblages. Post-Archaic period occupation of Site 32 [illegible] (see Chapter XI), and thus, analysis of the collection as a whole is [illegible] useful for characterizing, in general terms, Archaic period lithic assemblages [illegible] area.

[illegible] probabilistic sample units enables recovery of artifacts result[illegible] spatially localized activities across the site, but in order to obtain contextual [illegible] necessary for proper interpretation of activities, efforts are often better [illegible] larger, continuous areas. A "representative" population of artifacts [illegible] the sample is drawn so that spatial relationships between artifacts [illegible]. [illegible] (19[illegible]:252), citing Jelks (1975), has noted that:

> . . . if my concern is with the internal organization of a site, what [illegible] I learn from a 10-3[illegible] percent random spatial sample. Nothing or very little. I might be able to define the problem in that I could demonstrate differences and similarities between the sample units. However the necessary spatial structure of proximity, association with features, and patterns of continuous variation, which provide the [illegible] warrants in the definition of a structure, would still be [illegible].

Block Excavations

[illegible] emphasis [illegible] the fieldwork was placed on the intensive block excavation [illegible]. This [illegible] resulted in the recovery of a collection of artifacts which is "biased" [illegible] representative or even horizontal spatial coverage of the site. How[illegible], Phase I [illegible] pits, systematic sample units, and backhoe trenches indicated that [illegible] are more shallow and mixed the further the distance from the central, deep [illegible] the site. The probability is high that cultural materials long exposed on the [illegible] or buried shallowly in loose sand have been displaced either by natural agents or [illegible] human activity. Artifacts buried in the deeper portions of the site are con[illegible] to represent a more complete, and spatially more intact, inventory of material [illegible] utilized during the various site occupations. Ideally, block excavations placed in

both central and peripheral areas of the site would provide a greater chance for identifying broad spatial patterns of activity at the site. However, the problems with the physical context of the data in the shallower, peripheral areas would severely limit interpretations of site chronology and function.

The block excavation samples for Units 1 and 2 are the only samples* at the site which can be reasonably separated by occupational periods (see Chapter XI). Such separation would not have been possible had not large, contiguous areas been excavated. Assuming that changes in use of space occur through time, artifact patterning may be identified and interpreted more clearly with the delimitation of increasingly discrete time periods.

Surface Feature Excavations and Phase I Test Pits

These two artifact samples are relevant to specific problems in the investigation of Site 32 and are of limited use for quantitative discussions. The Phase I test pits provided preliminary information concerning the kinds of artifacts present at the site, as well as limited data concerning densities and distributions. This information was used to plan the Phase II investigations. Artifacts from the surface feature trenches are intended primarily for interpretation of the features. With few exceptions, however, these artifacts are few in number and not demonstrably associated with use of the features. These two samples are combined under the heading "Miscellaneous" in the provenience tables.

Use of Samples in the Artifact Analyses

Specimens recovered from all of the samples are considered in the description and classification of the collection. The analysis of raw materials involves only those items recovered from the systematic sample units. All specimens have been analyzed for construction of the general reduction model and for quantification of the functional attributes of the tools because the systematic sample collection is not sufficiently large to ascertain trends in the data. It is felt that the limitations for artifact interpretation involved in the use of spatially biased data by far are outweighed by the contextual information gained through the use of block excavations.

Description of the Collection

All of the specimens recovered during the Site 32 investigations are classified and described in this section. The primary emphasis of the classification is on reduction technology; i.e., specimens are grouped by shared attributes hypothesized to relate to

---

*Unfortunately, the extent of excavations in Unit 3, and thus the usefulness of the artifact sample, is limited.

reduction activities of similar nature and degree. Five major groups are recognized: (1) unmodified flakes, chips and angular fragments; (2) edge-modified flakes, chips and angular fragments; (3) unmodified cores; (4) edge-modified cores; and (5) shaped unifaces and bifaces. Under each of these headings the basis for assignment of specimens into that particular group (or subgroup within the group) is given. Also, for each group a table is included which presents the number of specimens for each recovered sample. Distributions are presented graphically for the surface collection and for each 10-cm level in Units [illegible] and [illegible].

Unmodified Flakes, Chips and Angular Fragments
(Table 10; Figs. 39, 40 and 41)

FLAKES (6752 specs.)

Flakes consist of all pieces of lithic material which were removed by percussion or pressure from a larger core or nucleus and which have a striking platform and/or positive bulb of percussion. Flakes are divided into three reduction categories based on the amount of cortex present:

Primary (356 specs.): Primary flakes have cortex covering the entire dorsal surface and striking platform. These flakes represent initial chipping of unmodified nodules. Primary flakes constitute a relatively small percentage (5.3) of the total number of flakes from Site 32.

Secondary (4352 specs.): These are flakes with cortex which do not qualify as primary flakes; i.e., the cortex does not cover the entire dorsal surface and striking platform. Secondary flakes represent chipping of partially decorticated cores. The flakes are subdivided on the basis of presence or absence of cortex on the striking platform. The high percentage of secondary flakes (64.5 percent) probably reflects the frequent use of relatively small, heavily weathered gravels.

Interior (2044 specs.): Interior flakes lack cortex and represent chipping of more completely decorticated cores. Because some raw material types (e.g., some sandstones and limestones) often do not weather sufficiently to form distinctive cortex, some flakes identified as interior may have resulted from earlier stages of reduction.

CHIPS (5150 specs.)

Chips represent the distal portions of broken flakes, or flakes with striking platforms which have been crushed completely. Chips were recognized in the collection either by: (1) an identifiable bulb of percussion but no striking platform or a crushed area representing the former platform, or (2) percussion rings ori[illegible] toward a lateral fracture with a bulb of percussion and platform area absent. Chips are subdivided on the basis of presence (secondary) or absence (interior) of cortex. Interior chips constitute [illegible] percent of the total. The secondary/interior ratio differs substantially from that of the flakes. One factor accounting for this difference may be that distal portions of broken cortex platform flakes would be classified as interior chips. Another contributing factor may be that the presence of cortex makes platforms less likely to be crushed, and thus, a greater percentage of interior debitage fails to retain platforms.

TABLE 10

PROVENIENCE OF UNMODIFIED FLAKES, CHIPS AND ANGULAR FRAGMENTS

	Surface Collection #	%	Systematic Sample Excavations #	%	Block Excavation Units: Unit 1 #	%	Unit 2 #	%	Unit 3 #	%	Miscellaneous* #	%	Total #	%
PRIMARY														
Flakes	[illegible]	[illegible]	26	(4.1)	112	(1.3)	112	(3.2)	5	(0.9)	8	(2.9)	356	(2.1)
SECONDARY														
Flakes (Cortex Platform)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	779	[illegible]	159	(29.3)	47	(17.0)	3517	[illegible]
Flakes (Faceted Platform)	[illegible]	[illegible]	[illegible]	(4.7)	[illegible]	[illegible]	[illegible]	[illegible]	33	(6.1)	[illegible]	(7.2)	835	[illegible]
Chips	[illegible]	[illegible]	[illegible]	[illegible]	1059	(12.3)	433	[illegible]	[illegible]	[illegible]	[illegible]	(9.8)	1943	[illegible]
Angular Fragments	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	562	[illegible]	[illegible]	[illegible]	[illegible]	(27.5)	[illegible]	[illegible]
INTERIOR														
Flakes	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chips	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Angular Fragments	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

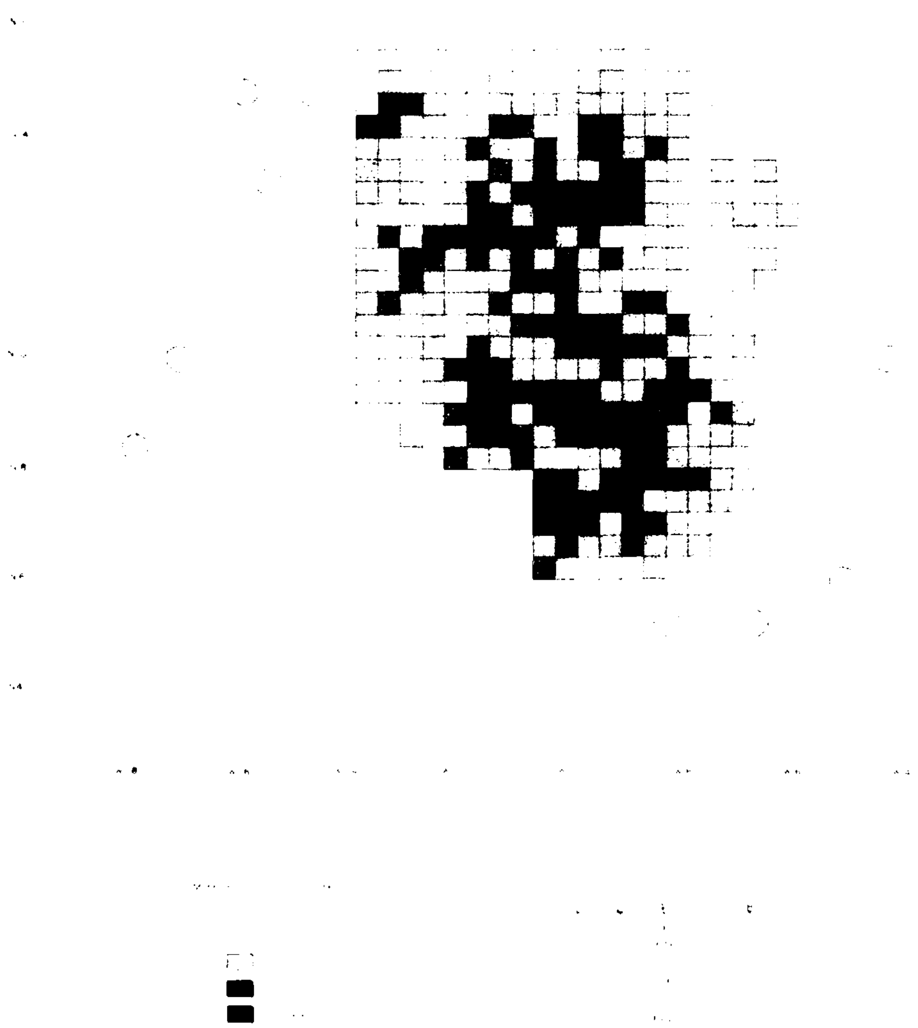
*[illegible]

Figure 39

KEYSTONE DAM PROJECT

SURFACE COLLECTIONS

DISTRIBUTION OF UNMODIFIED FLAKES, [illegible] AND [illegible] FRAGMENTS



KEYSTONE DAM PROJECT

UNIT I

DISTRIBUTION OF UNMODIFIED FLAKES, CHIPS & ANGULAR FRAGMENTS

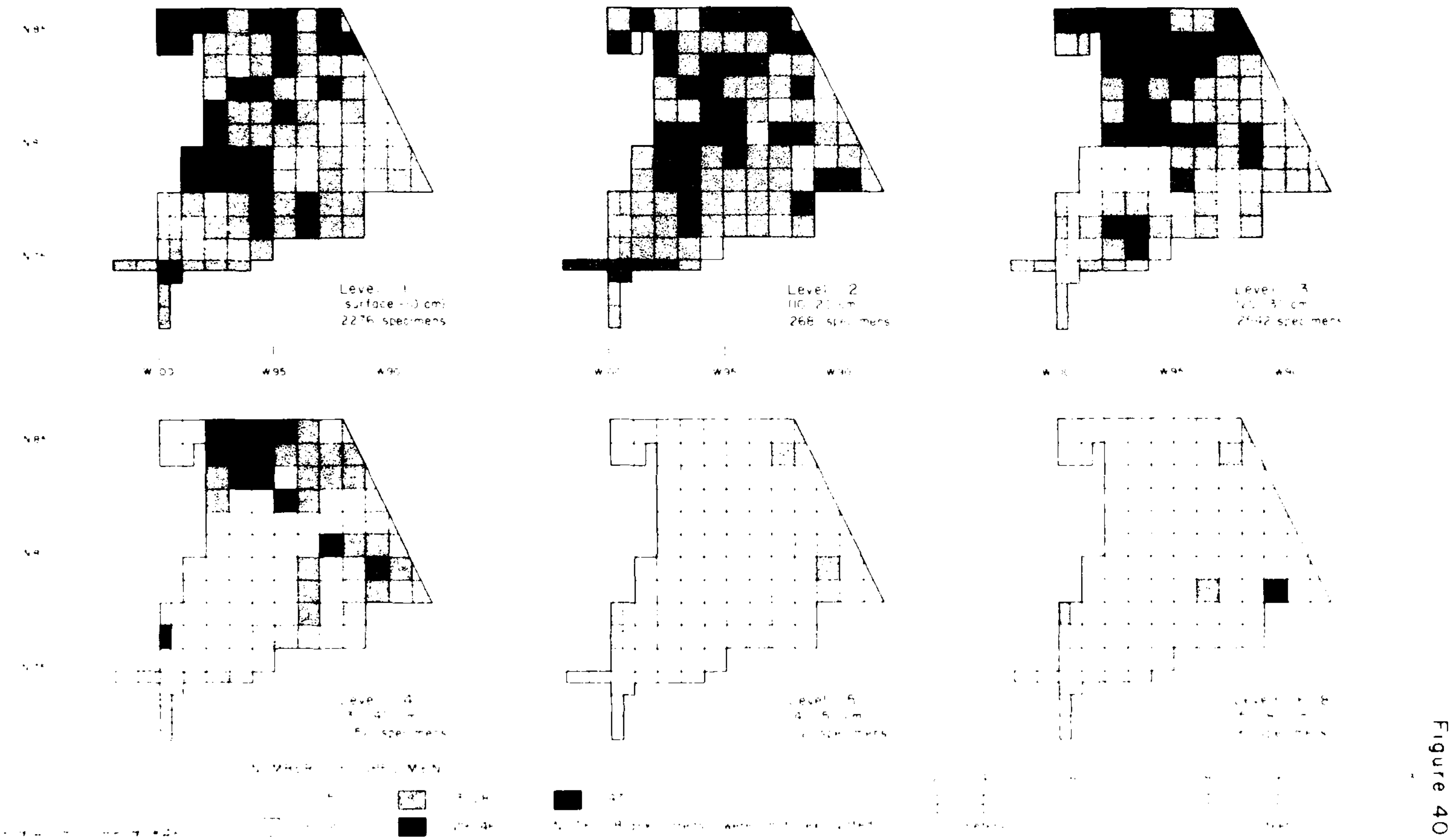


Figure 40

ANGULAR FRAGMENTS (4878 specs.)

Angular fragments are pieces of chipped stone which were removed from cores and which lack identifiable bulbs of percussion, striking platforms, percussion rings, or crushed platform remnants. Angular fragments generally have more than two surfaces and often lack feathered margins. Dorsal and ventral surfaces are identifiable, however, and multiple negative bulbs of percussion are not present on all surfaces. Although it is likely that the vast majority of angular fragments collected from the site resulted from cultural activity, naturally fractured gravels are abundant in the Site 32 deposits and many cannot be distinguished from fragments resulting from chipping activities. This situation pertains particulary to coarser grained materials such as much of the limestone and rhyolite. Over 62 percent of the angular fragments contain cortex.

Edge-modified Flakes, Chips and Angular Fragments
(419 specs.; Table 11; Figs. 42, 43 and 44)

This category consists of flakes, chips and angular fragments which have a macroscopically visible series of small flake scars along one or more margins. These secondary scars were produced either directly from use as a tool, or from marginal retouch. Retouched specimens are distinguished by a series of scars of generally equal size spaced in a relatively uniform manner along the margin. Specimens which have been use-modified only have scars of various sizes which are spaced irregularly along the modified edge. Overall, scars resulting from retouch tend to be larger than those resulting from utilization.

It is not likely that the relatively small percentage (2.4 percent) of flakes, chips and angular fragments identified as edge modified were the only specimens actually used as tools. The apparent expedient nature of manufacture of most items suggests that tools may have been discarded following relatively little use, in many cases perhaps before use-wear had a chance to develop. Experiments by Foster et al. (1982) with rhyolite tools indicate that edge modification may be difficult to detect even following relatively intensive utilization.

TABLE 11

PROVENIENCE OF EDGE-MODIFIED FLAKES, CHIPS AND ANGULAR FRAGMENTS

	Not Retouched #	Not Retouched %	Retouched #	Retouched %	Total
Surface Collection	124	(59.3)	85	(40.7)	[illegible]
Systematic Sample Excavation	16	(59.3)	11	(40.7)	[illegible]
Unit 1	56	(55.4)	45	(44.[illegible])	[illegible]
Unit 2	48	(65.8)	[illegible]	(34.[illegible]	[illegible]
Unit 3	2	(50.0)	[illegible]	([illegible])	4
Miscellaneous*	3	(60.0)	[illegible]	(4[illegible])	[illegible]
Total	249	(59.4)	170	(4[illegible])	4[illegible]

* Phase I squares and surface feature excavations not part of Units 1 or ...

Figure 41

KEYSTONE DAM PROJECT

UNIT 2

DISTRIBUTION OF UNMODIFIED FLAKES, CHIPS & ANGULAR FRAGMENTS

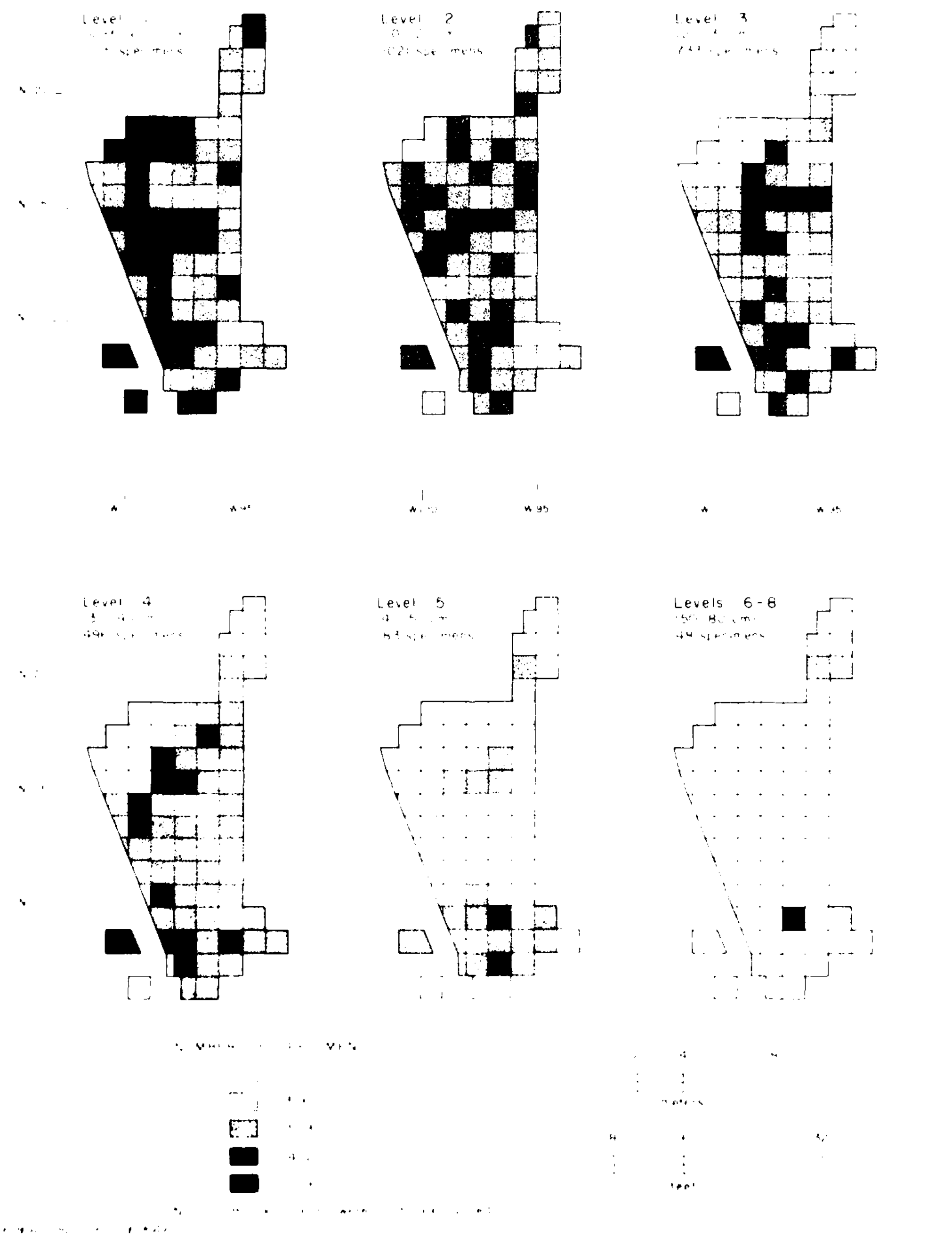
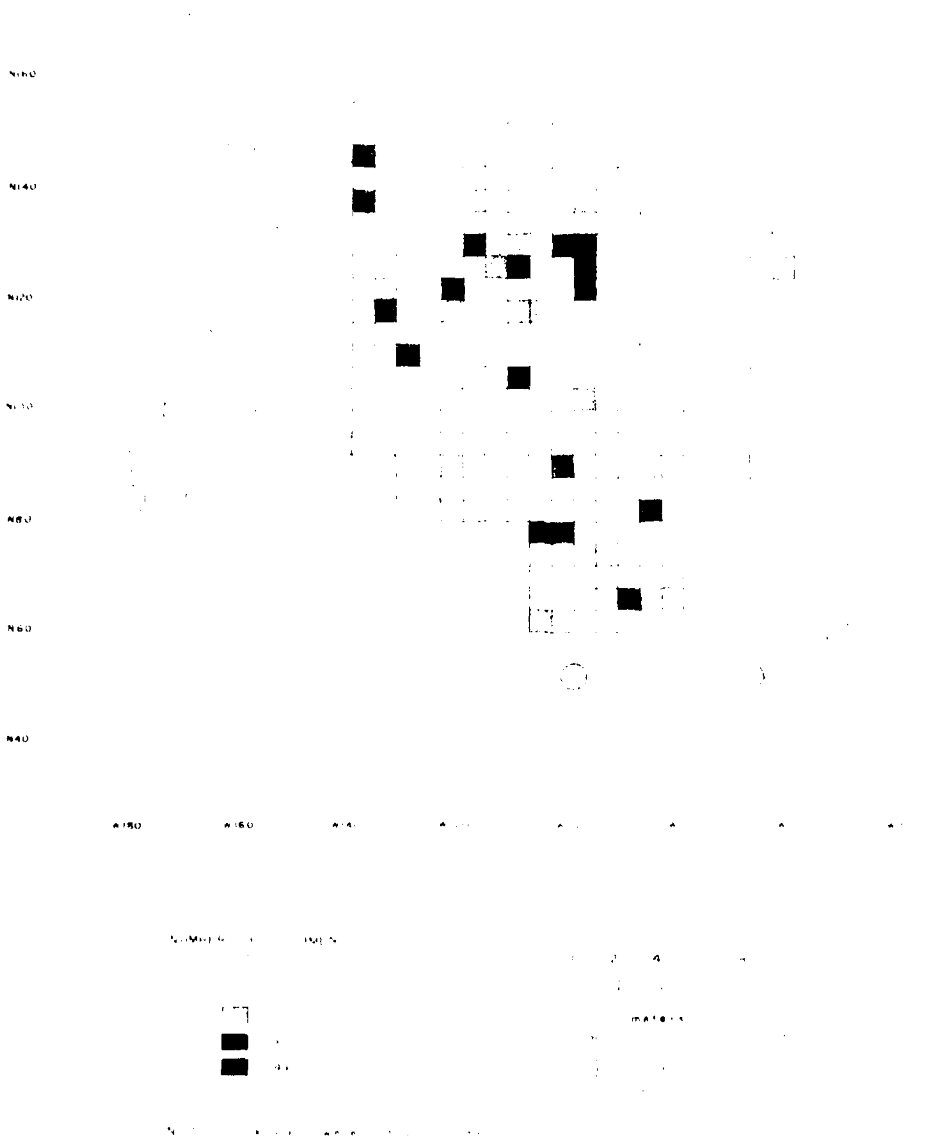


Figure 42

KEYSTONE DAM PROJECT

SURFACE COLLECTIONS

DISTRIBUTION OF EDGE MODIFIED FLAKES, ...



KEYSTONE DAM PROJECT

UNIT I

DISTRIBUTION OF EDGE-MODIFIED FLAKES, CHIPS & ANGULAR FRAGMENTS

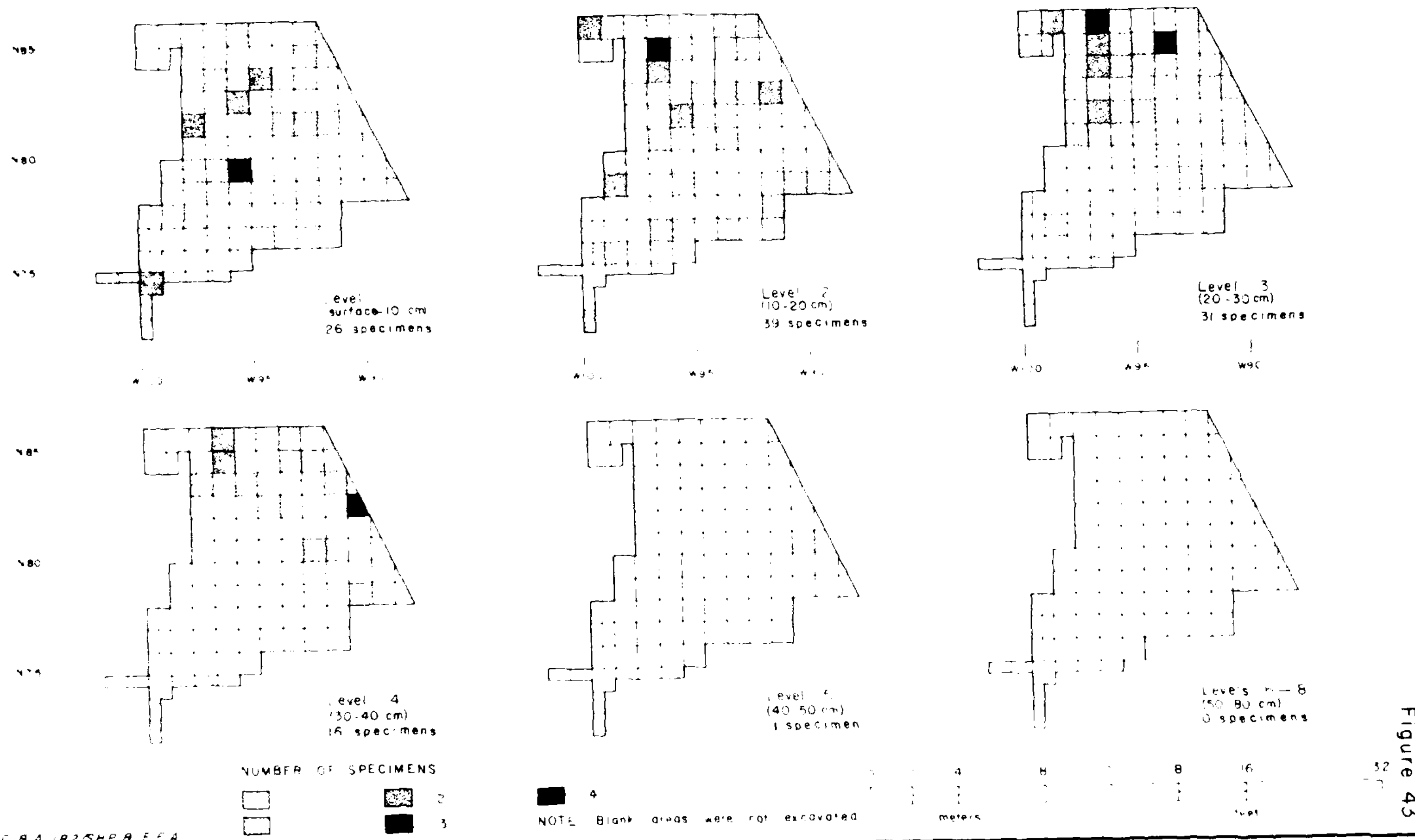


Figure 43

Unmodified Cores
(Table 12; Figs. 45, 46 and 47)

Cores are the nuclei from which flakes, chips and angular fragments have been detached. Generally, cores lack identifiable ventral surfaces with positive bulbs of percussion, but may have these if retouch flake scars are present on the ventral surface and are not confined to the margins. For example, large thick flakes and angular fragments are classified as cores if large flakes were removed from their surfaces subsequent to detachment from the original cobble or pebble. However, thick core fragments with positive bulbs of percussion are classified as flakes when the ventral surface has not been altered.

Three types of cores are recognized: single platform cores, multiple platform cores and bifacial cores.

SINGLE PLATFORM CORES (86 specs.; Fig. 51a)

All flake scars on these cores originate from a single surface. Although no patterned reshaping of the entire specimen outline is discernible, the chipped margins often are excurvate. Cross sections are thick and often have flat surfaces reflecting the frequent use of tabular or blocky nodules. Angles formed by the platform and chipped surfaces generally exceed 60°.

MULTIPLE PLATFORM CORES (1017 specs.; Fig. 51b)

On these cores, flakes were removed using several surfaces as platforms. No patterned reshaping of the specimen outline or cross section is discernible. Nodules of a variety of forms and sizes appear to have been used to produce these cores.

BIFACIAL CORES (30 specs.; Fig. 51c)

On bifacial cores, flakes have been removed from two opposing and adjoining platforms resulting in a single continuous bifacially chipped edge. On many specimens the bifacial edge extends around most of the core perimeter producing a roughly oval outline with biconvex cross sections.

Each of these groups of cores is subdivided on the basis of degree of reduction.

<u>Group 1</u>

These cores have less than five flake scars. In general, the raw material does not exhibit good conchoidal fracture and the chipping is irregular. The specimens appear to represent tested and rejected nodules from which usable flakes could not be obtained.

<u>Group 2</u>

These cores have multiple flake scars, but less than 50 percent of the cortex has been removed. The approximate size and shape of the original nodule is discernible.

Figure 44

KEYSTONE DAM PROJECT

UNIT 2

DISTRIBUTION OF EDGE-MODIFIED FLAKES, CHIPS & ANGULAR FRAGMENTS

TABLE 12

PROVENIENCE OF UNMODIFIED CORES

	Surface Collection		Systematic Sample Excavations		Block Excavation Units: Unit 1		Unit 2		Unit 3		Miscellaneous*		Total	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Single Platform														
Group 1	11	([illegible].4)	3	(75.0)	0	0	0	0	0	0	0	0	14	(16.3)
Group 2	[illegible]3	([illegible].3)	0	0	15	(71.4)	7	(87.5)	1	(50.0)	1	(50.0)	57	(66.3)
Group 3	[illegible]	([illegible])	1	(25.0)	6	(28.6)	1	(12.5)	1	(50.0)	1	(50.0)	15	(17.4)
Group 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	4[illegible]		4		21		8		2		2		86	
Multiple Platform														
Group 1	[illegible]	([illegible])	4	(11.4)	28	(8.8)	[illegible]	([illegible])	4	(10.8)	3	(17.6)	93	(9.1)
Group 2	[illegible]	(2[illegible].8)	[illegible]	(25.7)	113	(35.5)	65	(35.[illegible])	11	(29.7)	5	(29.4)	321	(31.6)
Group 3	[illegible]	(4[illegible].5)	12	(34.3)	131	(41.2)	78	(42.2)	17	(45.[illegible])	7	(41.2)	451	(44.3)
Group 4	[illegible]4	([illegible])	10	(28.6)	46	(14.5)	25	(13.5)	5	(13.5)	2	(11.8)	152	(14.9)
Total	41[illegible]		35		318		185		37		17		1017	
Bifacial														
Group 1	[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Group 2	[illegible]	(14.3)	0	[illegible]	2	(28.6)	1	(16.7)	[illegible]	[illegible]	[illegible]	[illegible]	5	(1[illegible].7)
Group 3	11	([illegible])	[illegible]	[illegible]	5	(71.4)	[illegible]	([illegible])	1	([illegible])	[illegible]	([illegible])	[illegible]	([illegible])
Group 4	[illegible]	([illegible])	[illegible]	[illegible]	[illegible]		[illegible]	([illegible])	[illegible]		[illegible]	([illegible])	[illegible]	([illegible])
Total	[illegible]		[illegible]		7		[illegible]		[illegible]		[illegible]		[illegible]	
GRAND TOTAL	[illegible]		[illegible]		346		[illegible]		[illegible]		[illegible]		[illegible]	

* [illegible] not part of Units 1 or 2.

Figure 45

KEYSTONE DAM PROJECT

SURFACE COLLECTIONS

DISTRIBUTION OF UNMODIFIED CORES

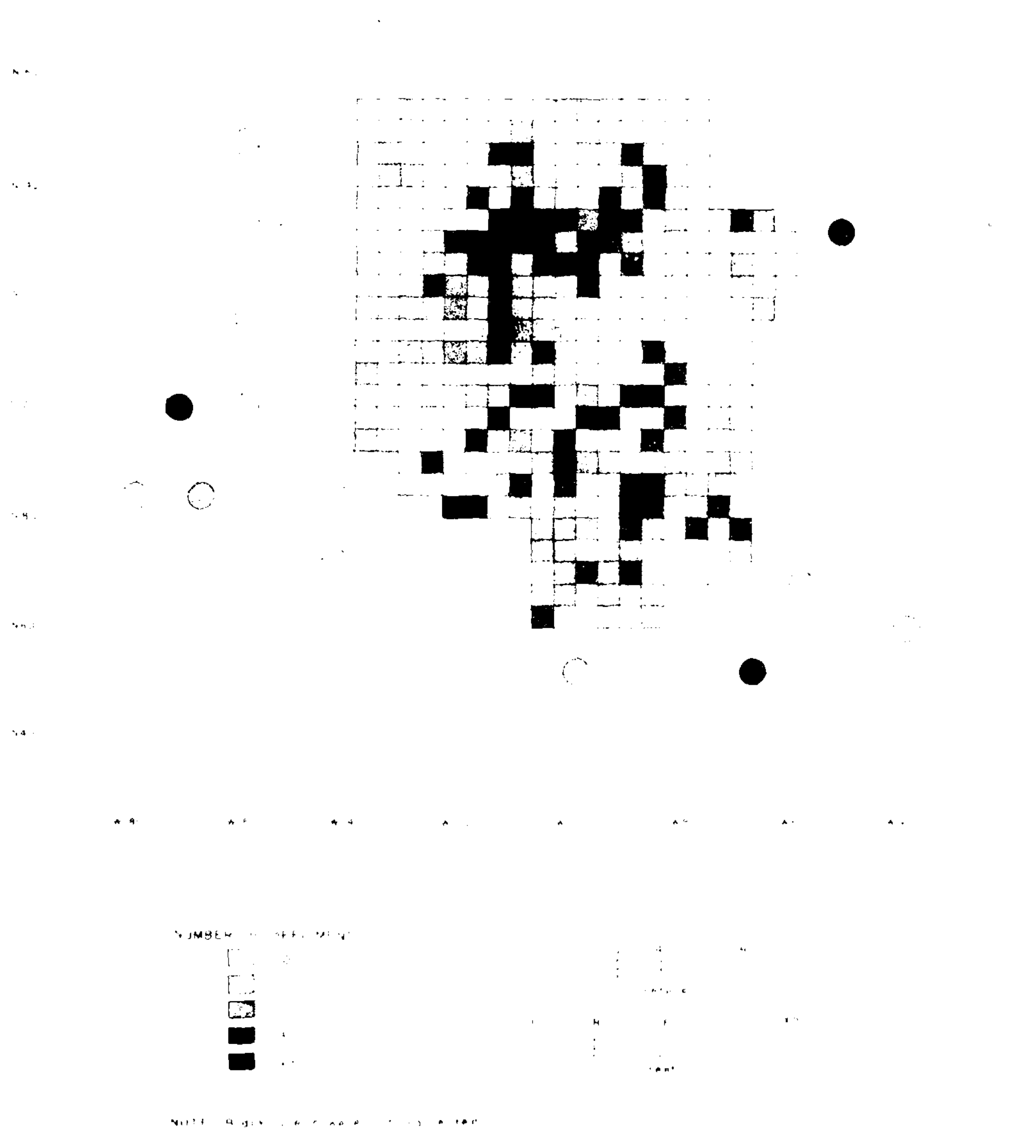
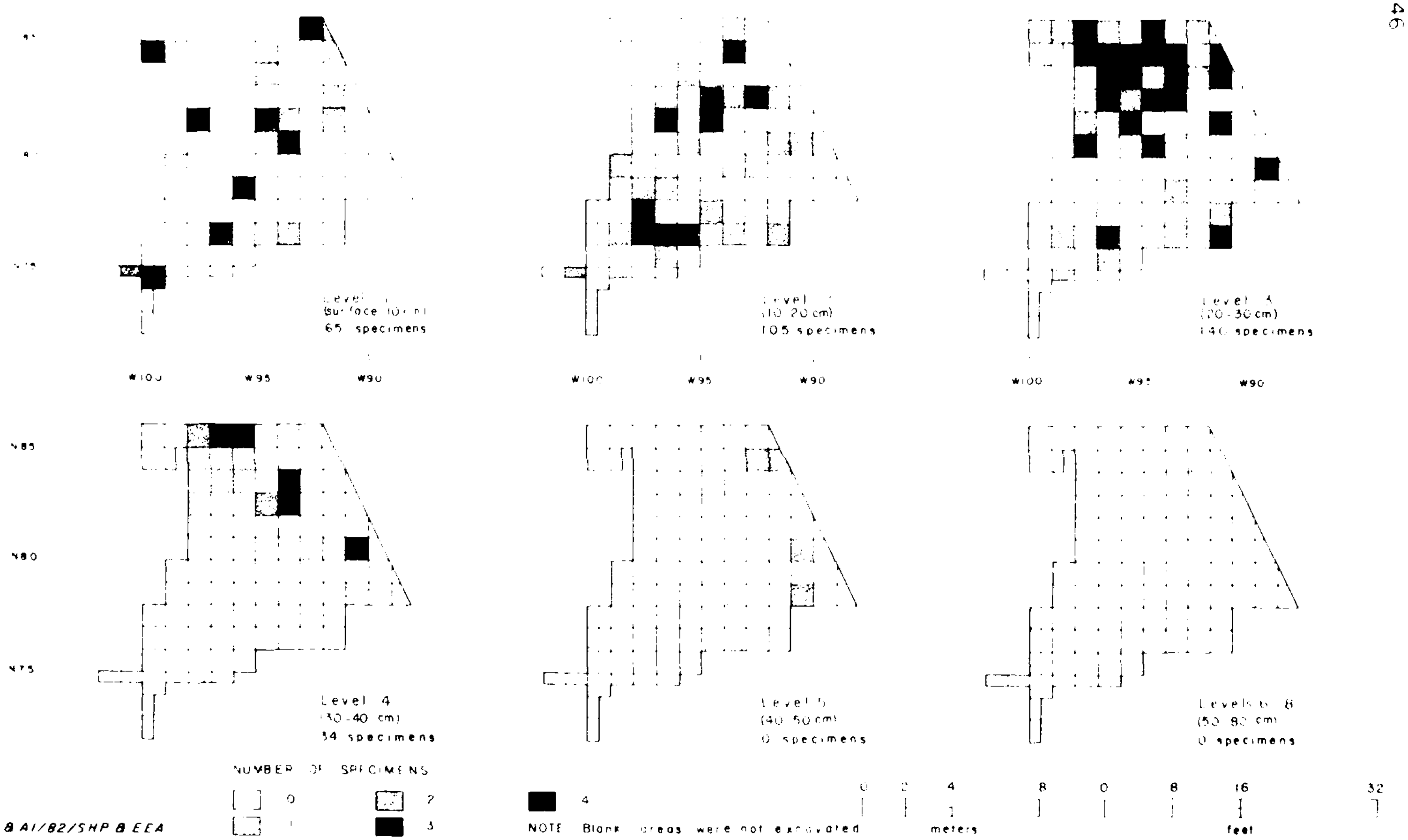


Figure 46

KEYSTONE DAM PROJECT

UNIT I

DISTRIBUTION OF UNMODIFIED CORES



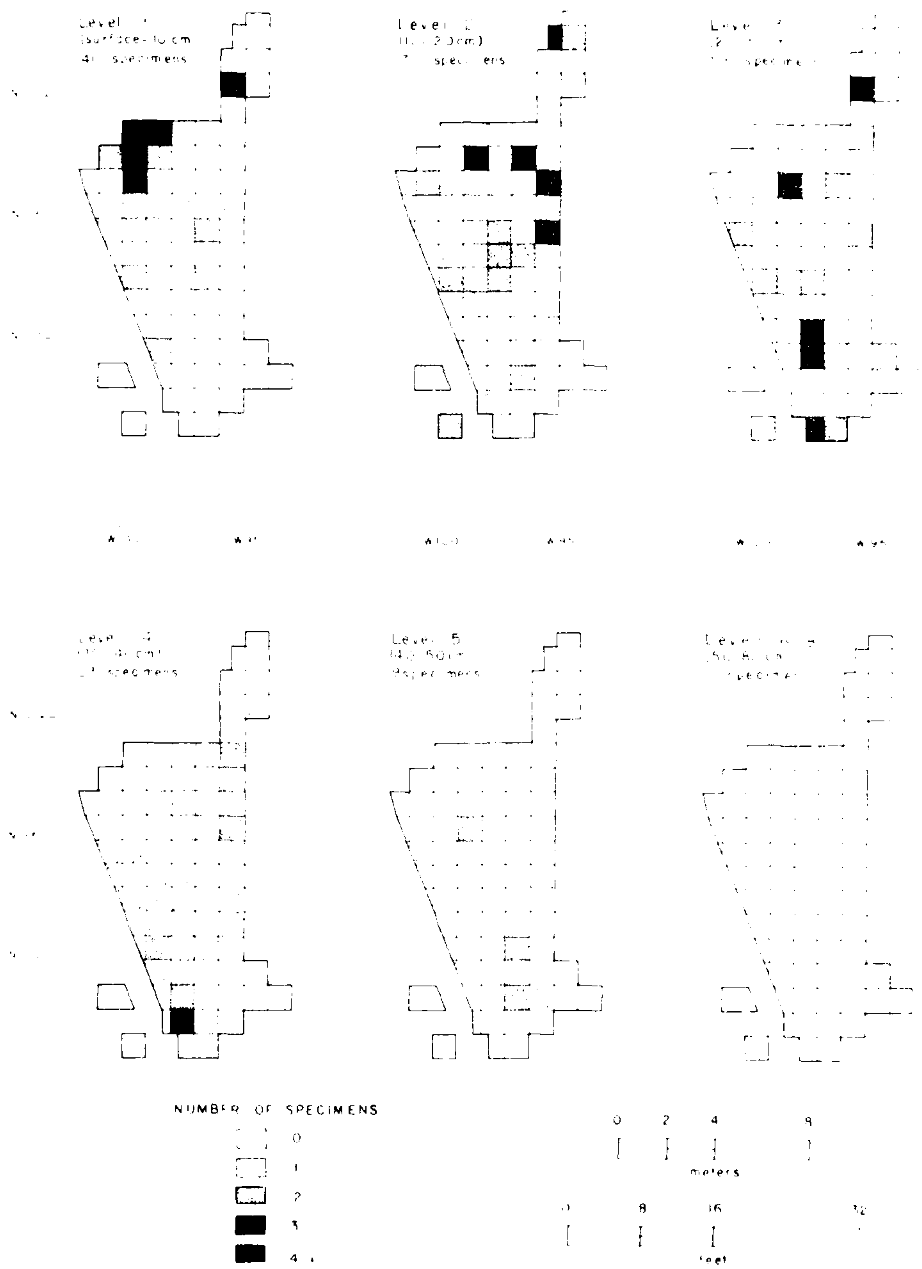
P & AI/82/SHP & EEA

Figure 47

KEYSTONE DAM PROJECT

UNIT 2

DISTRIBUTION OF UNMODIFIED CORES



NOTE: Blank areas were not excavated

Group 3

These cores have multiple flake scars and retain some cortex. The cortex covers less than [illegible] percent of the remaining surface area. The size and form of the [illegible] nodule usually is not discernible.

Group 4

These are extensively reduced cores with little (less than [illegible] percent of the remaining surface) or no cortex remaining. The specimens appear to represent exhausted cores from which usable flakes no longer could be detached. Group 4 pertains [illegible] multiple platform cores.

Edge-modified Cores
(178 specs.; Table 13; Figs. 48, 49 and 50)

Edge-modified cores are distinguished from unmodified cores by the presence of a series of macroscopically visible small flake scars along the core margins. These scars are confined to the margins and are inferred to be the result either of direct utilization or secondary retouch. The specimens are further classified as single platform, multiple platform, bifacial, battered, or edge-modified nodules. The single platform, multiple platform, and bifacial cores have characteristics similar to those described for the unmodified specimens plus the secondary scarring. Battered cores are multiple platform cores with edge damage in the form of extensive step fracturing and crushing. The battering often has resulted in less jagged, more rounded outlines and cross sections than are evident on other cores. Edge-modified nodules are large pebbles or small cobbles which have edge scarring but lack primary core reduction. Two groups within the edge-modified nodules are recognized. The first group consists of relatively small, flat pebbles with naturally thin edge angles. The second group consists of angular small cobbles with a variety of edge angles and shapes.

Shaped Unifaces and Bifaces
(Table 14; Figs. 48, 49 and 50)

This category consists of extensively retouched flakes and cores whose outlines have been modified into distinctive shapes. The degree of reduction carried out on most specimens precludes separation into direct core-reduced tools and those chipped from flakes or angular fragments. Specimens are subdivided into unifacially retouched and bifacially retouched groups. Further classification is by steepness of retouch and/or outline shape.

SHAPED UNIFACES (6 specs.)

Steep Marginal Retouch (4 specs.; Fig. 52a-c)

Three complete and one fragmented tool have planoconvex cross sections with edge angles that approximate 90°. Two of the complete specimens have triangular outlines; the

TABLE 13

PROVENIENCE OF EDGE-MODIFIED CORES

	Surface Collection		Systematic Sample Excavations		Block Excavation Units: Unit 1		Unit 2		Unit 3		Miscellaneous*		Total	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Single Platform														
Group 1	0	-	0	-	1	(11.1)	0	-	0	-	0	-	1	(3.3)
Group 2	13	(100)	0	-	7	(77.8)	4	(80.0)	2	(100)	1	(100)	27	(90.0)
Group 3	0	-	0	-	1	(11.1)	1	(20.0)	0	-	0	-	2	(6.7)
TOTAL	13		0		9		5		2		1		30	
Multiple Platform														
Group 2	0	-	0	-	4	(28.5)	1	(14.3)	1	(50.0)	0	-	6	(21.4)
Group 3	2	(40.0)	0	-	7	(50.0)	5	(71.4)	0	-	0	-	14	(50.0)
Group 4	3	(60.0)	0	-	3	(21.5)	1	(14.3)	1	(50.0)	0	-	8	(28.6)
TOTAL	5		0		14		7		2		0		28	
Pattered Cores														
Group 1	1	(9.1)	0	-	0	-	0	-	0	-	0	-	1	(4.8)
Group 2	5	(45.4)	0	-	4	(80.0)	2	(66.7)	2	(100)	0	-	13	(61.9)
Group 3	5	(45.4)	0	-	1	(20.0)	1	(33.3)	0	-	0	-	7	(33.3)
TOTAL	11		0		5		3		2		0		21	
Bifacial Cores														
Group 1	[illegible]	(37.5)	[illegible]	-	3	(27.3)	0	-	0	-	0	-	[illegible]	(14.[illegible])
Group 2	[illegible]	[illegible]	[illegible]	-	7	([illegible]3.6)	1	(33.3)	1	(100)	0	-	12	(4[illegible])
Group 3	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	2	(66.7)	0	-	0	-	[illegible]	[illegible]
TOTAL	[illegible]		[illegible]		11		3		1				[illegible]	
[illegible]														
[illegible]	11	[illegible]	[illegible]	-	6	(46.2)	4	(33.3)	[illegible]	-	1	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	(53.8)	[illegible]	[illegible]	[illegible]	-	[illegible]	-	[illegible]	[illegible]
TOTAL	41		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
GRAND TOTAL	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	

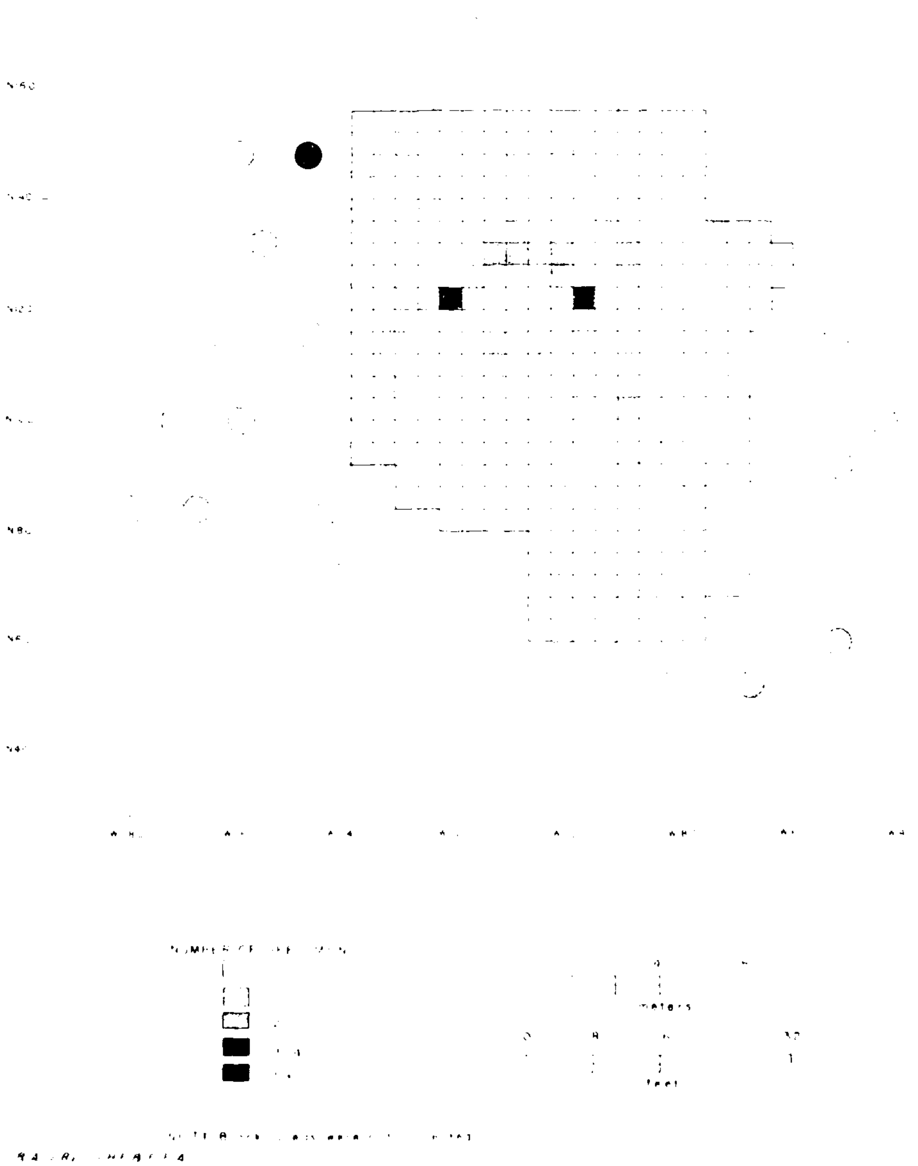
*[illegible] feature excavation [illegible] part of Units 1 or 2.

Figure 48

KEYSTONE DAM PROJECT

SURFACE COLLECTIONS

DISTRIBUTION OF EDGE-MODIFIED CORES & SHAPED BIFACES & UNIFACES



KEYSTONE DAM PROJECT

UNIT I

DISTRIBUTION OF EDGE-MODIFIED CORES & SHAPED BIFACES & UNIFACES

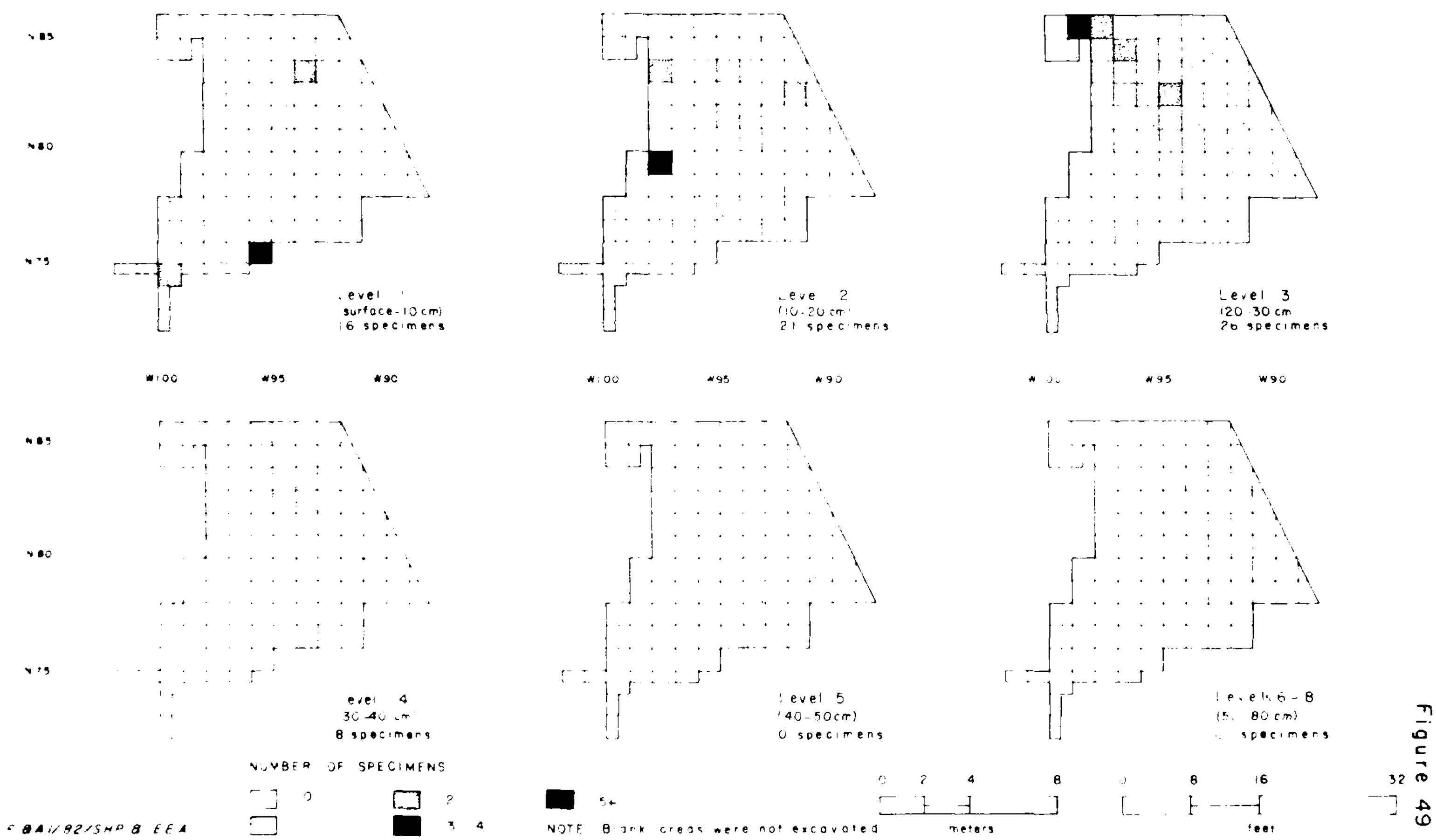


Figure 49

TABLE 14

PROVENIENCE OF SHAPED UNIFACES AND BIFACES

	Surface Collection	Systematic Sample Excavations	Block Excavation Units: Unit 1	Unit 2	Unit 3	Misc.*	Total
Unifacial Tools							
TOTAL	2	0	3	1	0	0	6
Bifacial Tools							
Projectile Points							
Group 1	1	1	1	1	0	0	4
Group 2	1	0	2	1	0	0	4
Group 3	0	0	3	0	0	0	3
Group 4	0	0	1	0	0	1	2
Miscellaneous	1	0	1	2	1	1	6
Misc. Bifaces	2	0	1	2	0	0	5
Biface Fragments							
Group 1	1	0	4	0	0	2	7
Group 2	5	0	1	0	0	0	6
Miscellaneous	1	0	1	1	0	0	3
TOTAL BIFACES	12	1	15	7	1	4	40
TOTAL UNIFACES AND BIFACES	14	1	18	8	1	4	46

*Phase I squares and surface feature excavations not part of Units 1 or 2.

outline of the third is roughly ovoid. The latter specimen (Fig. 52c) is truncated by a transverse fracture, and it is possible that a pointed distal end originally was present. The fragment (not illustrated) consists only of a small portion of an excurvate margin, but lacks cortex and appears to represent a shaped tool rather than an edge-modified core.

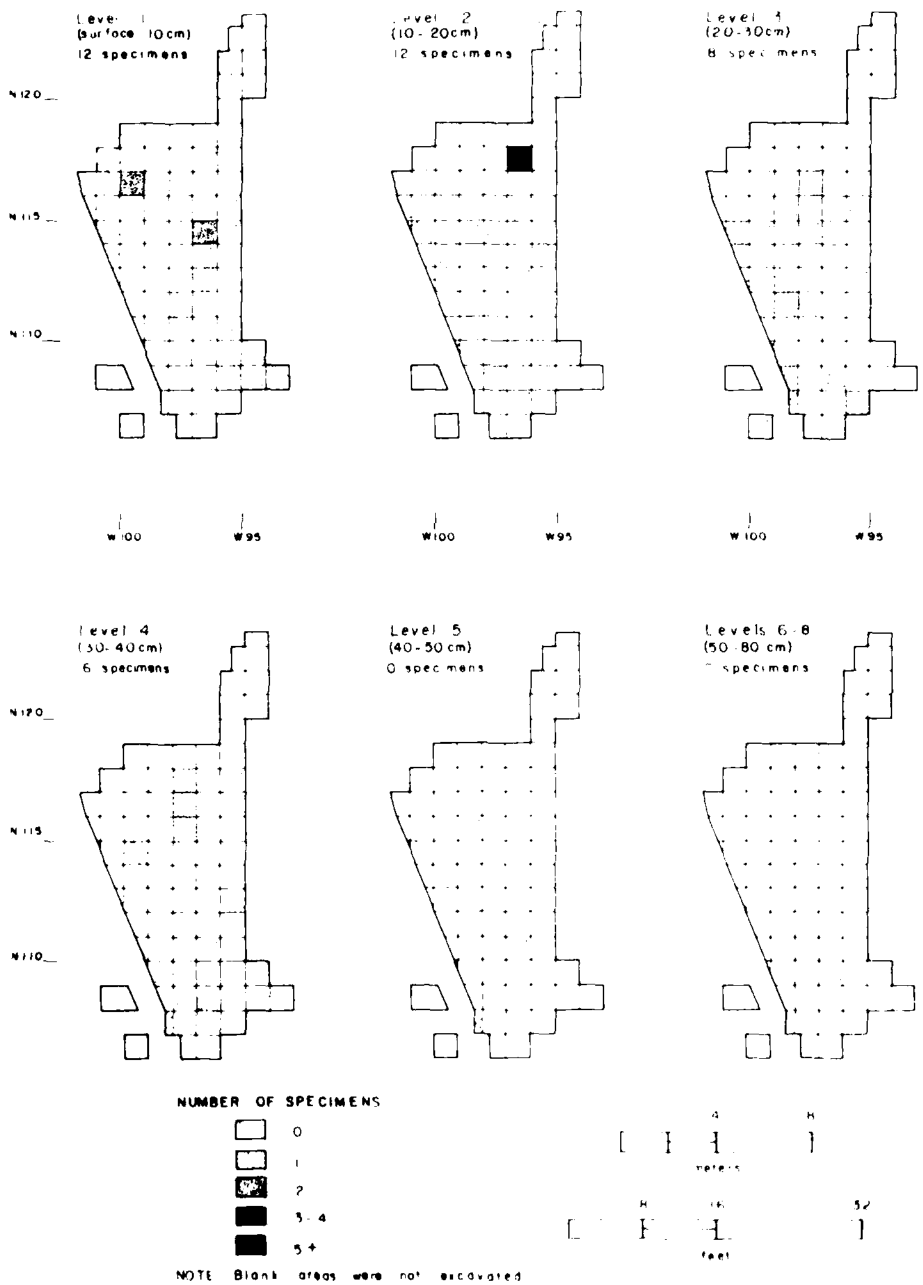
All of these specimens appear to have been reduced from thick flakes or angular fragments, but this cannot be determined with any certainty. Percussion probably was the primary chipping technique employed as evidenced by flake scars with well-defined negative bulbs of percussion and expanding lateral margins. One complete specimen (Fig. 53a) and the fragment have small secondary retouch scars along the margins that may have been formed by pressure flaking. The other specimens lack secondary marginal retouch but have step scarring that probably represents use-wear.

Figure 50

KEYSTONE DAM PROJECT

UNIT 2

DISTRIBUTION OF EDGE-MODIFIED CORES & SHAPED BIFACES & UNIFACES



P&AI/82/SHP & EEA

Figure 51. Selected Cores with Cross Sections.

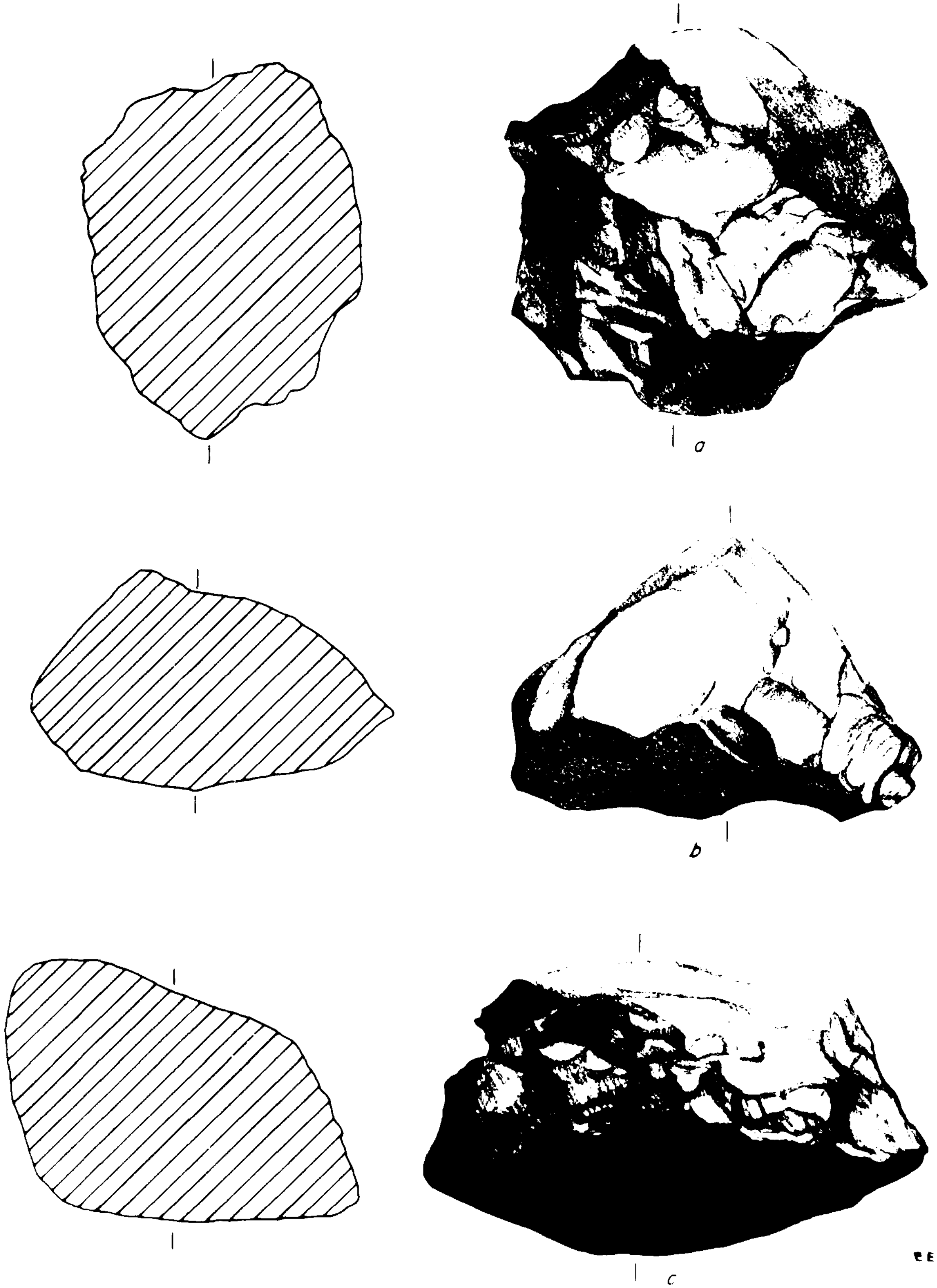
a. Single platform core, edge modified (Group 2). Pink and dark red rhyolite porphyry; dull luster; fair conchoidal fracture (Unit 2, N117/W100, Level 1).

b. Multiple platform core, unmodified (Group 3). Black basalt porphyry with pink phenocrysts; dull luster; fair conchoidal fracture (surface collection, N124/W96).

c. Bifacial core, unmodified (Group 3). Reddish tan and gray sandstone; dull luster; good conchoidal fracture (surface collection, N84/W168).

All artifacts are drawn to actual size.

Figure 51



[illegible] Shaped Unifaces and Projectile Points

[illegible] Unifaces, Steep Marginal Retouch

a. [illegible] red and orange chert; waxy luster; excellent conchoidal fracture (surface collection, N100/W150).

b. Reddish brown banded chert; dull luster; good conchoidal fracture (Unit 1, N79/W97, Level 2).

c. Light to dark gray limestone; dull luster; good conchoidal fracture (Unit 1, N82/W94, Level 4).

Other Shaped Unifaces

d. Fine-grained dark purple basalt; dull luster; fair conchoidal fracture ([illegible]rface collection, N114/W112).

e. Light gray chert with darker banding; shiny luster; good conchoidal fracture (Unit 2, N111/W98, Level 3).

Projectile Points, Group 1

f. Banded reddish brown and gray fine-grained quartzite; dull luster; good conchoidal fracture (Systematic Sample Unit, N100/W110, Level 5).

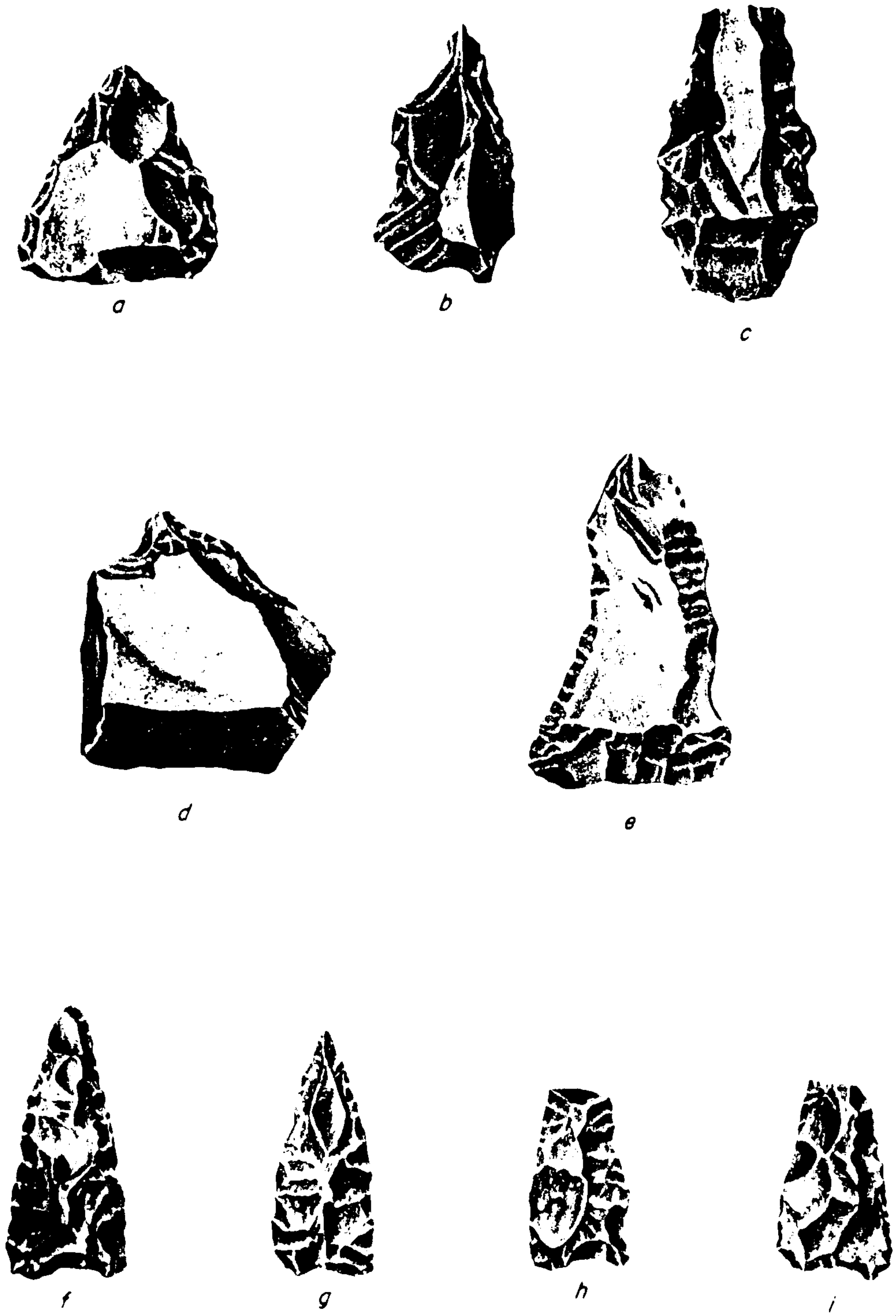
g. White to slightly pink chert; waxy luster; excellent conchoidal fracture (Unit 1, N85/W98, Level 3).

h. White to gray slightly translucent chert; waxy luster; good conchoidal fracture (surface collection, N[illegible]/W10[illegible]).

i. White chert; dull luster; fair conchoidal fracture (Unit 2, N114/W[illegible], Level 4).

[illegible] artifacts are drawn to actual size.

Figure 52



Flake Shaped Unifaces (2 specs.; Fig. 52d-e)

Two specimens which have been retouched unifacially are relatively thin in [illegible] and have edge angles of less than [illegible]°. One of these (Fig. 52e), essentially a [illegible] flake, is classified in this group because it appears that the margins have been shaped to form a roughly triangular outline. Flake scars are confined to the margins and are present along almost the entire perimeter of the flake. The scars are small, narrow, have roughly parallel margins, and lack negative bulbs, all of which suggest that pressure was the main technique employed.

The second specimen (Fig. 52d), also made from a large flake, has a small projection on one margin which shows extensive use scarring. The retouch carried out to form this [illegible] probably was by percussion.

SHAPED BIFACES (40 specs.)

The bifacial tools are separated into three major groups: projectile points, miscellaneous bifaces, and biface fragments.

Projectile Points (1[illegible] specs.)

All specimens with pointed distal ends and identifiable hafting elements are classified as projectile points. Four distinct groups of morphologically similar specimens are recognized, and six specimens are not assigned to any group.

Group 1 (4 specs.; Fig. 52f-i)

These specimens have medium-sized blades with slightly convex margins. All four are relatively well thinned and lenticular in cross section. Blades are triangular and lack distinct shoulders or stems, although the proximal one-third is slightly wider than the distal portion. Bases are concave and thinned.

All of these specimens appear to have been chipped from large pebbles or thick flakes. Large flake scars extending across the surfaces probably resulted from percussion, but smaller secondary scars along the margins may be from pressure retouch.

These forms are not common in the [illegible] area. There is some resemblance to Langtry points of the Big Bend region (Suhm and Jelks 19[illegible]:[illegible]7) although shallow side notches are not present (see Chapter XI).

Group 2 (4 specs.; Fig. 53a-d)

Group 2 specimens have medium-sized ovoid to lenticular blades and lack shoulders or stems. Blade margins are serrated on two specimens. Distal portions are narrow and have pointed tips; proximal portions are wider and have rounded ends. Cross sections are lenticular.

These specimens apparently were chipped from large pebbles or thick flakes. Flake scars appear to have resulted exclusively from percussion. Workmanship is very good and secondary marginal retouch is present.

These points are morphologically similar to the type Lerma found in southern Texas and northern Mexico (Suhm and Jelks 1962:207).

Group 3 (3 specs.; Fig. 53e-g)

Group 3 specimens have medium-sized blades of roughly lanceolate outline. Single, very weak shoulders may be present, but the opposing margins are continuous convex lines from base to tip. The shoulders may represent accidents of chipping rather than stylistic characteristics as they are difficult to define. Stems contract to small, slightly concave bases on two specimens; the base of the third specimen (Fig. 53g) has been broken. One specimen (Fig. 53e) has a slight bevel on the right margins; the other two are lenticular in cross section.

All of these specimens completely lack cortex and appear to have been made from large pebbles or thick flakes. Percussion probably was the primary technique of manufacture, although one specimen (Fig. 53d) has localized secondary marginal scarring from pressure retouch. Bases of the two complete specimens are formed by single hinge fracture scars which were struck from the juncture of the base and one face. The scar hinges around the base of the point and terminates on the opposing face. Whether this represents a fortuitous occurrence or was a deliberate technique of manufacture is uncertain. Without removal of this flake, these specimens would be identical morphologically to those of Group 1.

Similar forms have been found in the area (Beckes 1977; Whalen 1980), but no type designation has been assigned.

Group 4 (2 specs.; Fig. 53h-i)

This group consists of one complete and one fragmented specimen, both of which share [illegible]. The incomplete specimen (Fig. 53h) consists of a proximal tool portion [illegible] is broken just above the shoulders. On both specimens shoulders are [illegible]. Stems are [illegible] wide as the body and have roughly parallel [illegible] straight or slightly convex bases. Cross sections are lenticular.

[illegible] appear to have been reduced from large pebbles or thick flakes. Flake [illegible] parallel and transverse to the length of the specimen leaving a medial [illegible] marginal retouch is present.

[illegible] specimens from McGregor Range, but no type [illegible] have been made.

[illegible] Points (6 specs.; Fig. 53[illegible])

[illegible] points cannot be grouped with others in the collection and are described [illegible]. None of these specimens are assignable to defined types in the [illegible].

[illegible] has a triangular blade with slightly convex lateral margins. The edges are serrated except near the tip and secondary pressure retouch scars are present. Shoulders are of moderate size and are not barbed. The cross section is lenticular with slight beveling of the [illegible] margin. Stem margins expand slightly to a straight [illegible] base. This specimen has a slight thickening of the stem which may represent a

... jasper with mottled black inclusions; shiny luster; good ... fracture (Unit 1, N88/W94, Level 4; N84/W94, Level 3).

... chert; dull luster; good conchoidal fracture (Unit 1, ...).

... gray, fine-grained metaquartzite; dull luster; good conchoidal fracture (Surface Collection, N.../W100).

Mottled dark gray and olive chert; dull luster; good conchoidal fracture (Unit 1, N.../W..., Level ...).

... quartzite; dull luster; fair conchoidal fracture (Unit 1, ...).

... and purple chert; shiny luster; good conchoidal fracture (Unit 1, ...).

... chert with dark blue speckled and linear inclusions; waxy luster; ... fracture (Unit 1, N76/W93, Level 4).

... rhyolite with few phenocrysts; dull luster; good conchoidal ... (..., N.../W..., Level 1).

... quartzite; dull luster; good conchoidal fracture (BHT A, ...).

... chert; shiny luster; good conchoidal fracture (Unit 2, ...).

... chert; shiny luster; fair conchoidal fracture (Unit 2, N116/W99, ...).

... black basalt; dull luster; excellent conchoidal fracture (Unit 3, ..., Level 1; Surface Collection, N88/W104).

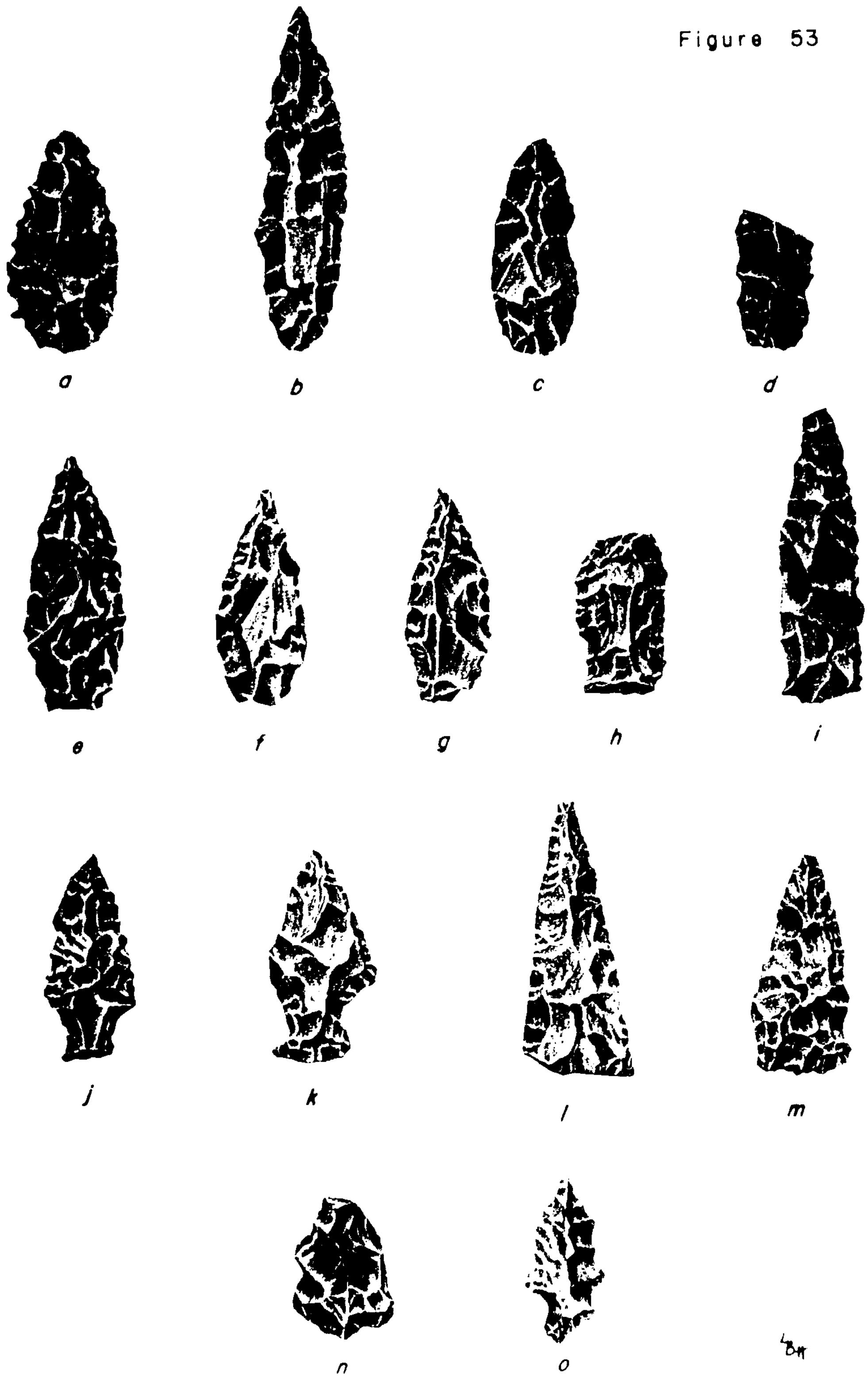
Light and dark gray banded chert; waxy luster; excellent conchoidal fracture (Surface Collection, N92/W104).

... gray to black obsidian; glassy luster; excellent conchoidal fracture (..., N.../W94, Level 3).

... gray, semitranslucent chert; shiny luster; excellent conchoidal fracture (Surface Collection, N128/W108).

... are drawn to actual size.

Figure 53



former bulb of percussion suggesting that a thick flake was used as a blank. The thick base possibly represents the former striking platform.

The second specimen (Fig. 53k) has a triangular blade with relatively straight lateral margins. One of the margins has been transversely fractured leaving a flat broken edge. Small flake scars within the break facet indicate that an attempt was made to sharpen the edge. The shoulders are well defined but not barbed. The stem expands slightly to a thinned convex base.

The third specimen (Fig. 53l) is unstemmed, has a triangular outline, and is lenticular in cross section. The lateral margins are slightly excurvate from the tip to about three-quarters of the distance to the base. From this point they flare out slightly. The base is slightly convex. This specimen has been very well thinned and the entire surface is covered with pressure flake scars.

The fourth specimen (Fig. 53m) has a triangular body with slightly excurvate lateral margins. The cross section is lenticular. Shallow side notches form small shoulders and a short, strongly expanding stem. The base is slightly convex. It is not possible to determine whether this specimen was reduced from a flake blank or directly from a large pebble. Primary chipping appears to have been percussion, but extensive secondary marginal pressure retouch also was carried out.

The body of the fifth specimen (Fig. 53o) is small and triangular with slightly excurvate lateral margins. The shoulders are well defined but not barbed. The stem expands slightly to an asymmetrical pointed base. This specimen was made from a small flake blank. Primary flake scars probably are the result of percussion techniques, while secondary marginal flaking may have involved pressure.

The sixth specimen (Fig. 53n) has a roughly triangular outline with shallow side notches and a broad rounded base. The lateral margins are irregular and the tip is missing. No secondary marginal retouch was carried out and a chipping knot is present on one surface. This point probably represents a preform broken and rejected during manufacture.

Miscellaneous Bifaces (5 specs., Fig. 54a-e)

Five bifacially retouched specimens lack pointed tips and/or definable hafting elements and thus are not classified as projectile points. The specimens are described individually below.

The first specimen (Fig. 54a) is a relatively large tool with a triangular outline, rounded tip, and thin lenticular cross section. The lateral margins are sinuous from the distal end until about two-thirds of the distance to the base. At this point the margins expand slightly to the slightly concave base. It is likely that the tool was produced from a large flake blank. Retouch scars are relatively large with well-pronounced negative bulbs indicating that percussion was the main technique employed. There was no attempt to thin and straighten the margins with secondary retouch. Edge angles along the distal portion of the tool are relatively steep and the body narrows slightly. These characteristics suggest that resharpening of the edges may have been carried out.

The second specimen (Fig. 54b) has an elongated outline and a thick planoconvex cross section. The proximal portion of the tool has not been chipped, and it is evident that the specimen was reduced from an ovoid small cobble that was split longitudinally. Flake scars are confined to the margins, but the outline of the distal portion has been reshaped. Cortex covers the entire convex dorsal surface of the original cobble. Reduction was by percussion and secondary marginal flakes are absent.

The third specimen (Fig. 54c) is a small flake which has been retouched to form a quadrangular outline. The margins are straight. Three have been bifacially chipped; the fourth is thick and retains the cortex striking platform of the flake blank. It appears that pressure was involved extensively in retouch of the flake.

The fourth specimen (Fig. 54d) has an elongated ovoid outline and is rectangular in cross section. The tool has been reduced from a tabular large pebble of chert. Only a single face and the distal end are chipped. The lateral margins remain thick and the proximal portion is unworked. The chipped face was thinned by utilizing the thick lateral margins as platforms. Steep unifacial edges were produced between the lateral faces and the thinned face. These edges contain small step scars which probably represent use-wear. The distal end has been bifacially chipped to form a rounded margin with a relatively thin edge angle. Retouch probably was by percussion only.

The fifth specimen (Fig. 54e) is semicircular in outline and contains both bifacially and unifacially chipped segments along its margins. The specimen was reduced from a large thick flake whose cortex platform was not removed during retouch. Steep unifacial secondary marginal retouch is evident along the margin opposite the platform. Secondary retouch is lacking on the other margins, and chipping appears to have been carried out by percussion.

Biface Fragments (16 specs.)

Group 1 (7 specs.)

This group consists of apparent projectile point fragments. Included are two pointed tips, one medial section, and four proximal fragments. One proximal fragment contains a single side notch and a portion of a slightly concave base. The second proximal fragment appears to have a concave base similar to the Group 1 projectile points. However, the specimen is much thinner and exhibits finer pressure retouch than is evident on any of the Group 1 points. The third proximal fragment consists of the stem of a small obsidian point. The lateral margins converge slightly to a straight thick base with cortex. The fourth proximal fragment appears to represent a rounded contracting stem with a single squared shoulder.

Group 2 (6 specs.)

These specimens all have convex bifacially chipped margins. Two appear to represent the rounded distal portions of relatively large bifaces. The other specimens are too fragmented for interpretation.

Miscellaneous Fragments (3 specs.)

Three specimens are not assigned to either of the above groups. One is a medial section of a biface of unknown shape. Two excurvate chipped margins are present that converge toward a break facet.

Figure 54. Miscellaneous Bifaces.

a. Light tan chert; shiny luster; good conchoidal fracture (Unit 1, N74/W99, Level 1).

b. Medium-grained grayish brown rhyolite; dull luster; poor conchoidal fracture (Surface Collection, N136/W124).

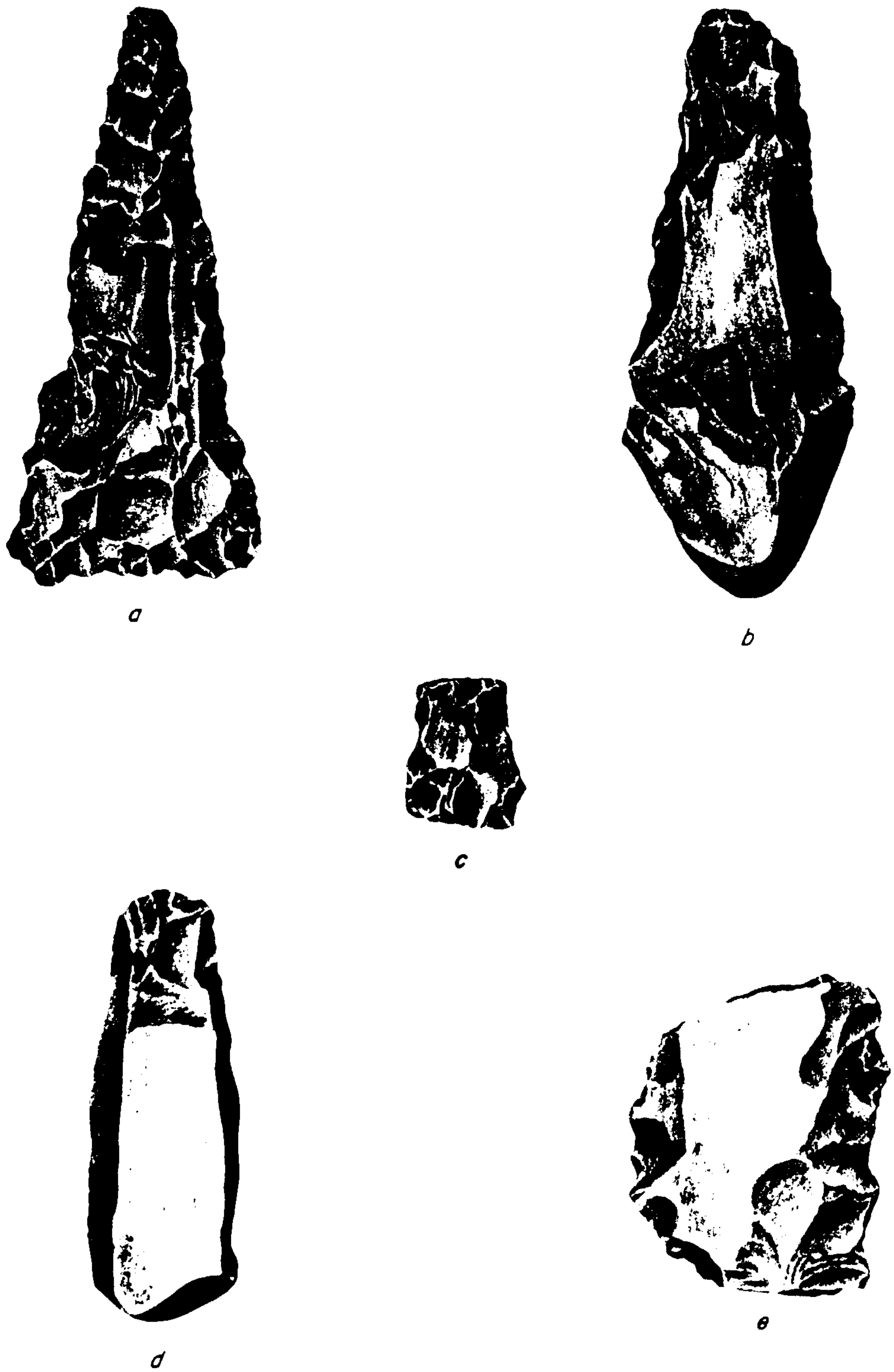
c. Dark blue-gray chert; shiny luster; good conchoidal fracture (Unit 2, N121/W95, Level 1).

d. Black chert with sandstone inclusions; shiny luster; good conchoidal fracture (Unit 2, N115/W97, Level 4).

e. Dark purple fine-grained basalt; dull luster; good conchoidal fracture (Surface Collection, N96/W112).

All artifacts are drawn to actual size.

Figure 54



The second fragment is small and has a quadrangular outline. The edge angles are steep, and three edges appear to represent rechipped transverse breaks.

The third specimen is the distal portion of a broken flake of obsidian which has pressure flake scars extending across the ventral surface and partially across the dorsal surface. The flake has both a longitudinal and a lateral transverse fracture. The distal end of the flake was modified to form a pointed tip.

Manufacturing Technology

Two topics are addressed in this section. The first topic concerns raw material utilization and consists of brief descriptions of the represented raw materials and their probable sources of procurement. Data from the systematic sample unit excavations are then used in a discussion of raw materials and major artifact classes.

The second topic concerns identification of the steps involved in the production of tools. A general reduction model is presented which orders the products and by-products of the tool manufacturing process into several hypothesized reduction trajectories.

Raw Material Types

Seven general types of lithic raw materials are identified in the chipped stone collection from Site 32. Each of these types is available in the alluvial and colluvial gravels on and directly adjacent to the site. The range of materials is similar to that identified by O'Laughlin (1980:170) from Sites 33 and 34, but percentages of materials within the sites differ. Each of the material types is described briefly below. Information concerning the size range and general abundance of materials in the local gravels is from O'Laughlin's (1980:170) report of Sites 33 and 34 and from general observations made during fieldwork at Site 32.

DESCRIPTION OF MATERIALS

Chert

All materials of cryptocrystalline silica are classified under the general term chert. Varieties of chert in the collection include chalcedony, silicified wood, jasper and silicified sandstone. A wide variety of colors, types of inclusions, and fracture properties are present. A small number of specimens have a waxy luster and are potlidded suggesting heat alteration, but such alteration may have been fortuitous rather than a deliberate technique of manufacture. No spatial correlation was noted between possibly heat-altered cherts and fire-cracked rock features.

Chert is available along the Mesilla Valley border surface which include river deposits of sand and gravels. The deposits are derived both from local and distant upstream rock types (Gile et al. 1981:43), and thus, cherts present in the gravels exhibit a wide range of variability. O'Laughlin reports that cherts are not particularly abundant in the

gravels of the project area and rarely exceed 8 cm in maximum length. Chert specimens in the collection tend to be smaller than those of other material types (with the exception of obsidian), and it is likely that most were obtained from very local sources. Other potential source areas of chert include the Franklin and Hueco mountains and, more distantly, the Organ and Sacramento ranges. Whalen (1978:4) reports that much of the chert from the Franklin and Hueco mountains is highly fractured and generally unsuitable for tool manufacture.

Rhyolite

Rhyolite is an igneous-volcanic rock that occurs as a major component of the Franklin Mountains. Rhyolite ranges from coarse to fine grained and often includes phenocrysts of quartz, feldspar or biotite (Foster et al. 1982:[illegible]). In the collection, two general varieties of rhyolite are evident. One has a light grayish pink to purple color, is very fine grained, and includes few phenocrysts. The second variety is fine to coarse grained, light purple to rose-colored, and porphyritic. Fracture ranges from conchoidal on many of the fine-grained specimens to crumbly on several coarse-grained specimens.

Small- to medium-sized angular cobbles of rhyolite porphyry occur in colluvial deposits from the Franklin Mountains and are scattered throughout the project area, particularly on the ridgetops. Rhyolite also is common in the river-deposited gravels in the form of subangular to rounded pebbles and cobbles with cortex. O'Laughlin ([illegible]) reports a size range of 5 to [illegible] cm in the gravels, but specimens of larger size were observed in the field. Rhyolite is the most common rock type found on and immediately adjacent to Site 32 and thus was a readily available lithic resource.

Fine-grained Quartzite

Fine-grained metaquartzites commonly were used for chipped stone tools at Site [illegible], but coarser grained quartzites appear to have been used almost exclusively for ground, pecked or battered stone tools. Fine-grained metaquartzite exhibits similarities to chert, but individual silica grains are visible microscopically and luster generally is dull relative to chert. Most specimens exhibit fair to good conchoidal fracture. A wide range of colors is present, but light brown, gray, reddish brown, and purple are most common.

Fine-grained quartzite also is available in the local alluvial gravels. O'Laughlin (1980:170) reports that most nodules are under 10 cm in maximum length and are much less numerous than rhyolite or limestone.

Sandstone

Several specimens in the collection are made from a fine-grained, slightly friable sandstone. Some of the sandstone is very well silicified and grades into chert. Light brown and dark reddish brown varieties are present.

O'Laughlin (1980:170) reports that sandstone is rare in the local gravels. Angular chunks as large as 15 cm in maximum length were observed on the surface and slopes on and around Site 32. These chunks may have originated from sandstone which occurs in the Franklin Mountains (Whalen 1978:4).

Basalt

All dark-colored, fine-grained volcanic rocks are classified as basalt in this study. The basalt in the collection exhibits fair to good conchoidal fracture. Color ranges from dark gray to dark purple to black.

Field observations indicated the presence of relatively small (under 10 cm) basalt nodules in the vicinity of Site 32, but these are not numerous.

Limestone

Several artifacts from Site 32 are of limestone. This material varies greatly in texture and fracture properties, but in general it is relatively coarse grained and exhibits only fair conchoidal fracture. The color of most specimens ranges from light to dark gray.

Like rhyolite, limestone is a major constituent of the Franklin Mountains, and angular to rounded cobbles and pebbles are liberally scattered across the alluvial slopes on the western side. Limestone also appears to be the most common rock type in the river-deposited gravels. Maximum lengths of nodules reported by O'Laughlin range from 5 to 20 cm.

Obsidian

Obsidian comprises the smallest percentage of identifiable rock types in the Site 32 collection. Color ranges from a translucent dark gray to black. Some of the obsidian is heavily weathered and has a dull sheen.

Many specimens have a distinctive, thick, rounded cortex and probably represent river-deposited pebbles. O'Laughlin reports that these pebbles are rare in the local gravels and rarely exceed 5 cm in diameter.

DISCUSSION

Based on data from the systematic sample excavation units, chert appears to be the most abundant material among the lithic artifacts at Site 32 (Table 15). As chert is not the most numerous material represented in the local gravels, a selection bias for this material appears to have been employed by the Site 32 inhabitants. This find is not unexpected considering the relatively good fracture properties of chert and the apparent preference for chert at other sites in the project area (O'Laughlin 1980:170). This pattern differs, however, from that found at several sites on the eastern slopes of the Franklin Mountains where percentages of material types generally conformed to local availability in terms of abundance and ease of procurement (O'Laughlin and Greiser 1973; O'Laughlin 1979: 78).

Relative percentages of raw materials differ significantly among the major technological classes of artifacts (Table 15). Although chert comprises 41.7 percent of specimens in the unmodified flake and core classes, only 32.4 percent of specimens in the tool classes are chert. Rhyolite, on the other hand, comprises 45.9 percent of the tools and [illegible] percent of the unmodified flakes and cores. This pattern differs from that reported

TABLE [illegible]

MAJOR ARTIFACT CATEGORIES BY MATERIAL TYPE FOR SYSTEMATIC SAMPLE UNITS

	Unmodified Debitage	Unmodified Cores	Edge-Modified Debitage	Edge-Modified Cores	Shaped Bifaces and Unifaces	Total
Chert	274 (40.2)	26 (66.7)	11 (40.7)	1 (11.1)	0	[illegible] (41.2)
Rhyolite	205 (30.1)	8 (20.5)	9 (33.3)	8 (88.9)	0	[illegible]
Quartzite	74 (10.9)	4 (10.3)	2 (7.4)	0	1 (100.0)	[illegible]
Limestone	45 (6.6)	1 (2.5)	0	0	0	46 [illegible]
Sandstone	32 (4.7)	0	1 (3.7)	0	0	[illegible] (4.4)
Basalt	21 (3.1)	0	4 (14.8)	0	0	[illegible]
Obsidian	1 (0.1)	0	0	0	0	[illegible]
Unidentified	29 (4.3)	0	0	0	0	[illegible]
TOTAL	681	39	27	9	1	[illegible]

by O'Laughlin (1979:38) at the Community College sites east of the Franklin Mountains. It is suggested that the percentages at Site 3[illegible] may reflect more-extensive reduction of chert nodules as opposed to nodules of other materials. Equal reduction would result in greater amounts of rhyolite debitage as rhyolite nodules tend to be larger than those of chert. Comparisons of percentages of chert and rhyolite unmodified cores for each of the reduction categories (Table 16) supports this interpretation as, except for the anomalous Group 1 specimens, percentages of chert are greater for more extensively reduced specimens. It should be recalled that Group 1 cores appear to have been rejected due to major material flaws prior to removal of even one usable flake. Also apparent from Table 15 is that core tools are present in greater percentages of rhyolite than of chert, while edge-modified flakes reflect material percentages similar to the unmodified flakes. This pattern parallels that found at other sites in the El Paso area from which there is comparable data (O'Laughlin and Greiser 1973; O'Laughlin 1979:39, 1980:174) and has been related to the greater ease of production of usable chert flakes and the unsuitability of chert cores as tools due to their small size (O'Laughlin 1979:38).

A strong preference for chert for the manufacture of shaped bifaces has been noted in the El Paso area (O'Laughlin and Greiser 1973; O'Laughlin 1979, 1980). Insufficient data from the systematic sample units were recovered to evaluate this situation at Site 3[illegible]; however, in the total collection from the site, percentages of raw materials for the shaped bifaces and unifaces (46 specimens) are as follows: chert ([illegible] percent), obsidian (8.7 percent), quartzite (8.7 percent), basalt (4.[illegible] percent), sandstone ([illegible] percent), and limestone (2.2 percent). Thus, as at the other sites, chert and obsidian were strongly preferred, probably due primarily to the relative ease that fracture can be controlled with these materials.

TABLE 16

UNMODIFIED CORES BY REDUCTION GROUP AND RAW MATERIAL TYPE
(SYSTEMATIC SAMPLE UNITS)

	Reduction Groups				
	1	2	3	4	Total
Chert	6 (85.7)	3 (33.3)	9 (69.2)	8 (80.0)	26
Rhyolite	1 (14.3)	3 (33.3)	3 (23.1)	1 (10.0)	8
Quartzite	0	3 (33.3)	1 (7.7)	0	4
Limestone	0	0	0	1 (10.0)	1
TOTALS	7	9	13	10	39

General Reduction Model

The chipped stone technology represented at Site 32 appears to have been directed toward the manufacture of relatively simple flake and core tools from locally obtained pebbles and cobbles. Retouch predominantly consisted of edge modification without substantial thinning or reshaping of margin outlines. Thus, few specimens were abandoned at intermediate stages of reduction and distinct steps in the manufacturing sequence are identifiable only in a very general sense. However, variation in the forms and frequencies of cores and finished artifacts suggest that at least four distinctive reduction trajectories were carried out. These trajectories are represented schematically in Figure [illegible] and described in the following text.

TRAJECTORY A

Trajectory A represents the dominant reduction strategy carried out at the site. Primary chipping of unaltered large pebbles or small cobbles produced flakes, chips and angular fragments as well as unmodified multiple platform cores. Selected flakes, chips or angular fragments either were utilized directly as tools or secondary marginal retouch was carried out prior to utilization. It also is apparent that large thick flakes or angular fragments detached from unaltered nodules were retouched to form multiple platform cores.

Although multiple platform cores occasionally were utilized (as evidenced by secondary marginal scarring), it is hypothesized that primary emphasis was placed on the production of usable flakes. This appears evident as the multiple flake removals from these cores do not serve either to produce continuous functional edges or to thin the cores into blanks for the production of shaped bifacial tools. Data from the collection support the hypothesis in that scarring is present only on a very small percentage of the multiple platform cores relative to the other core types (Table 17).

[illegible]

TABLE 17

PERCENTAGES OF EDGE-MODIFIED CORES BY CORE TYPE

Core Type	Total Specimens	Total Edge-modified	Percent Edge-modified
Single platform	[illegible]	[illegible]	[illegible]
Multiple platform*	1045	[illegible]	[illegible]
Bifacial	55	[illegible]	[illegible]

*Battered cores are not included.

The extensive wear on the battered cores may have resulted in part from platform preparation or unsuccessful attempts to remove flakes. However, it also is possible that multiple platform cores occasionally were utilized as hammerstones. In any event, edge modification of the battered cores appears to be related to reduction processes different from those of other edge-modified cores.

TRAJECTORY B

Trajectory B represents a strategy for the production of single platform cores as well as flakes, chips and angular fragments. It is hypothesized that one purpose of this strategy was to form large unifacial core tools with steep edge angles. Two arguments seem to support this contention: (1) edge modification is discernible on single platform cores in much higher percentages than on multiple platform cores (see Table 17); and (2) even on specimens where raw material irregularities are not visible, single platform cores rarely are reduced beyond the Group 2 reduction stage (see Table 14). Single platform cores also probably have resulted from early rejection in attempts to successfully remove flake blanks.

TRAJECTORY C

The products of Trajectory C are bifacial cores and unmodified flakes, chips and angular fragments. Like single platform cores, the percentage of edge-modified specimens suggests that production of bifacial edges was for use of the core rather than representing an expedient way to remove flakes (see Table 17). Flakes resulting from the manufacture of single platform and bifacial cores also may have been important products, but it appears that Trajectories B and C represent production of functional core tools to a greater degree than Trajectory A.

TRAJECTORY D

Trajectory D consists of the direct utilization or edge retouch of unaltered pebbles or small cobbles. Two forms of nodules most often were utilized: flat pebbles with naturally thin edge angles, and relatively large angular cobbles of rhyolite.

MANUFACTURE OF SHAPED UNIFACES AND BIFACES

Two major difficulties are encountered in attempts to fit many of the shaped unifaces and bifaces into the reduction model. First, the degree of retouch on many specimens has obliterated attributes from which inferences concerning earlier stages of reduction may be made. Second, with one exception, specimens rejected during intermediate stages of reduction are not present in the collection. Despite these limitations, it is possible to make several inferences concerning the manufacture of these tools.

The three complete steep margin unifaces appear to have been made on thick flakes or angular fragments. Two (Fig. 52b and c) have not been thinned and resemble single platform cores except for the reshaping of the outline. Thus, they appear to represent modified products of Trajectory B. The third specimen (Fig. 52a) has undergone more extensive thinning, shaping and marginal retouch. It is of a chert type not noted elsewhere in the collection and possibly was not manufactured at the site.

The remaining two unifacial tools (Fig. 52d and e) essentially are edge-modified flakes with reshaped outlines. Thus, in terms of manufacturing technology, similarities are to Trajectory A.

Although it is possible that some of the unmodified bifacial cores represent blanks for production of other bifaces, there are no partially thinned and shaped forms which would represent a stage intermediate to the completed projectile points and miscellaneous bifaces. Two of the miscellaneous bifaces (Fig. 54b and d) probably were reduced directly from whole or split cobbles; the rest were made from flakes. The extensive pressure retouch of the small quadrangular flake biface (Fig. 54c) with flake scars extending across the entire face differs significantly from the emphasis solely on marginal retouch that is characteristic of Trajectory A. This specimen appears to be technologically similar to two small projectile points in the collection (Fig. 53c and e).

It does not appear likely that the [illegible] projectile points in the collection were manufactured at the site. Two lines of evidence suggest this contention:

(1) With one exception, no specimens appear to represent projectile point blanks or preforms. Although seven of the biface fragments may be portions of projectile points, the existing tips and margins are finely retouched suggesting post-manufacture breakage. It is considered likely that if projectile point manufacture was carried out at the site, intermediate reduction stages would be represented in the sample.

(2) Only three flakes in the collection have attributes characteristic of biface thinning or resharpening activities. These flakes have narrow platform angles, lipped platforms with multiple facets, and very diffuse bulbs of percussion. The former edge of the biface is recognizable along the juncture of the platform and dorsal surface. All of these flakes were retouched along portions of their margins subsequent to removal from the

[illegible]

[illegible] flake would have been [illegible] covered [illegible]

[illegible] of a small thin flake of [illegible] [illegible] projectile point (arrow point), although [illegible]

[illegible]

[illegible] are analyzed in this section [illegible] carried out at site [illegible]. The general [illegible] whether the occupation of the site were specialized toward [illegible] whether a wider range of activities appears to have [illegible] expected to be associated with the processing of [illegible] cutting, chopping, [illegible] and pulverizing [illegible] projectile points, [illegible] implements [illegible] relatively minor importance or [illegible].

[illegible]

Functional data are provided for [illegible] three of the [illegible] technolo- [illegible] classes: edge-modified flakes, [illegible] and angular fragments; edge-modified cores; [illegible] shaped bifaces and unifaces. All of the specimens in the collection within these classes are analyzed in terms of seven functional attributes. The study includes no experimentation with replicated tools as a means of testing the interpretations, and only a few of the total of potentially relevant attributes [illegible] analyzed. Because of this, conclusions are limited and general in nature. However, the attributes observed during this study have been used in functional tool studies at other sites in the El Paso area (e.g., O'Laughlin [illegible], 198[illegible]) and are presented here in an effort to provide a broad comparative data base from which patterning eventually may be identified which reflects patterning of prehistoric activities.

[illegible]TIONAL ATTRIBUTES OF TOOLS

[illegible] Marginal Retouch

The presence or absence of marginal retouch [illegible] for each modified edge is re- [illegible] along with whether the retouch [illegible] unifacially or bifacially. As stated pre- [illegible], retouch scarring is distinguished from use scarring by the overall larger size of [illegible] scars, and their relative spatial uniformity along the margin. Retouch may [illegible] sharpen or resharpen edges and/or to modify the shape of edge outlines.

[illegible] ranges of edge angles have been found to be most efficient for carrying out [illegible] activities (Semenov 1964; Wilmsen 1970). The frequently cited study [illegible]

Wilmsen (1970) suggests that acute edges ([illegible]° to [illegible]°) are efficient for cutting meat and skin; angles between 4[illegible]° and [illegible]° are useful for skinning, hide scraping, sinew and plant fiber shredding, and heavy cutting of wood, bone or horn; and angles between [illegible]° and 7[illegible]° are most useful for working wood and bone, and for heavy shredding.

O'Laughlin (1980:1[illegible]) found that edge angles of tools from Site 33 had an approximately normal distribution with no apparent breaks useful for classifying tools by this attribute. Assuming a similar situation for the Site 32 specimens and because functional correlates for small ranges of angle have not been defined, edges are classified into three broad classes of angles: 10° to 40°, 41° to 60°, and greater than 60°. Edges were measured against a polar grid when not easily assigned to a category. The recorded angles represent the convergence of the planes of the adjacent surfaces (plane-plane angles) and not the angle of the planes of the wear scars.

Use Wear

Although it is recognized that the factors involved in production of various types of use wear are complex, use-wear patterns, when used in conjunction with other functional data, may be useful for identifying tool functions. The broad range of raw materials used at Site 32 precludes any detailed study of use-wear patterns without extensive experimentation. For this analysis, the studies of Tringham et al. (1974), Ahler (197[illegible]), and Odell and Odell-Vereecken (1980) are drawn upon. These studies involved fine-grained cryptocrystalline materials and much of the raw material present in the Site 32 collection differs significantly. However, the patterns observed and recorded are of a sufficiently general nature that use of these studies is considered to be justified.

For identification of use-wear patterns, the "low power approach" used by Odell and Odell-Vereecken has been followed. All specimens were scanned through a binocular microscope at 10x and, when necessary, patterns were assessed at 20x or 40x. It should be restated that edge-modified specimens initially were distinguished by the presence of macroscopically visible use-scarring or retouch.

In order to obtain a body of data comparable to that reported by O'Laughlin from Site 33, use-wear is classified into one of three categories: feather scarring, step scarring, or abrasion (rounding or blunting of edges or tips). Scarring is recorded as present on one or both faces of the margin. Abrasion often is difficult to identify and assess objectively at low levels of magnification, particularly with many of the coarse-grained specimens in the collection, and so interpretations are based mainly on edge scarring.

Length of Functional Edge

The length of the functional edge is recorded in millimeters by following the contour of the edge outline. The functional edge is defined as the total extent of use wear and secondary retouch scarring; i.e., margins with a secondary retouch are included even in areas where use-wear was not identified. Specimens are considered to have more than a single modified edge where areas in the modification are separated by sharp breaks in angle of the specimen outline.

Tool Size

Tool size is recorded by two attributes: weight (in grams) and maximum length (in millimeters). O'Laughlin (1979, 1980) has used tool weight as a major variable for

separation of tools into functional groups representing light, medium and heavy processing activities.

Outline of Functional Edge

Functional edges are classified as convex, concave, straight, recurved or sinuous. Recurved margins have a single convex and a single concave portion. Sinuous margins have several convexities and concavities, and occasionally have unpatterned irregular appearances.

Raw Material Type

Because ranges of wear patterns, edge angles, and tool size are constrained by the size and fracture properties of raw materials, this attribute also is recorded for each specimen.

Discussion of the Data

The entire set of data generated in the analysis is presented in Appendix E. In this section, functional edge characteristics are discussed in terms of general types of activities.

Two attributes which commonly are correlated with general types of activities in studies of tool function are edge angle and use-wear patterns. For this analysis, these two attributes are treated as independent variables in order to construct meaningful functional categories of tools within the technological classes. As described earlier, all functional edges (excepting projections) are classified into one of three ranges of edge angles: 10° to 40°, 41° to 60°, and greater than 60°. Two types of use scarring are recognized (feathered and stepped) and each appear either on one or both faces of the margin. Combinations of each of these attribute states define 12 categories of edges. The remaining attributes are quantified within these categories for each of the technological classes in Tables 18 through 21. When interpreting these tables, it should be recalled that a single edge may have more than a single form of scarring and thus may be quantified into two separate categories. The number of edges with multiple forms of use scarring is given for each category.

The tables and the general discussion which follow pertain to the entire collection and thus should be considered most representative of the areas of high artifact density at Site 32 since the field strategy was biased toward these areas. Although the possibility cannot be discounted completely that unique, spatially restricted activities were carried out in nonsampled areas of the site, it is felt that the sample used here provides a good estimate of the range and relative occurrence of functional tool attributes at Site 32.

Edge-modified Flakes, Chips and Angular Fragments

Based on overall size and morphological characteristics, the edge-modified flakes, chips and angular fragments appear to have been used for three general types of activities: cutting, scraping and perforating. Evidence of perforating (drilling or boring) is present on projections of 10 specimens in the form of use scarring on the lateral margins

TABLE 18

[illegible] DATA [illegible] CATEGORIES [illegible] EDGE-MODIFIED FLAKES, [illegible] AND ANGULAR FRAGMENTS

Category	No. of Specimens	No. of Edges	Retouch Un	Retouch Bi	Other Scarring Un	Other Scarring Bi	Abrasion	Mean Length of Functional Edge	Mean Weight	A	B	C	D	E
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	11.[illegible]	[illegible] 41.[illegible]	[illegible]	9 37.[illegible]	1 4.[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	[illegible]		[illegible]	[illegible]	[illegible] 54.[illegible]	[illegible]	[illegible]	[illegible] 4.[illegible]	4 [illegible]
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	14 [illegible]	[illegible]	1 [illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		4[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1 [illegible]	4 3.8
[illegible]	[illegible]	[illegible]	15	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	41.[illegible]	[illegible]	[illegible]	4[illegible]	4[illegible]		[illegible]
[illegible]	4[illegible]	4[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1[illegible] 4[illegible]	[illegible]	[illegible] 4.4
[illegible]	[illegible]4	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4 [illegible]	[illegible]	1[illegible] 42.1	[illegible]	[illegible]
[illegible]	[illegible]4	[illegible]	4	[illegible]	[illegible]	[illegible]	1	27.3	[illegible]	[illegible]	1[illegible] 24.[illegible]	14 [illegible]	1 1.4	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	17.[illegible]	[illegible]	4 2[illegible]	[illegible]	1 [illegible]	[illegible]

[illegible] A = [illegible]; B = [illegible]ave; C = straight; D = recurved; E = sinuous.
[illegible] mean lengths [illegible] in mm; weight[illegible] in grams. Entry beneath numerical count under Functional Edge Outline is percent.

TABLE 1[illegible]

[illegible] DATA [illegible]

Category	No. of Specs.	No. of Edges	Retouch Un	Retouch Bi	Other Scarring Un	Other Scarring Bi	Attrition	Mean Length of Functional Edge	Mean weight	Functional Edge Outline A	B	C	D	E	Core Type SP	MP	BI	N
10-40° Unifacial feather	3	3	[illegible]	[illegible]	[illegible]		[illegible]	56.[illegible]	47.[illegible]	3 100	0 -	0 -	0 -	[illegible] -		0	0	3
10-40° Bifacial feather	11	11	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	76.2	6 54.5	0 -	3 27.3	1 9.1	1 9.1	1	1	0	6
10-40° Unifacial step	1	1	1	[illegible]	[illegible]	[illegible]		34.[illegible]	45.[illegible]	1 100		0	0		0	0	0	1
10-40° Bifacial step	4	4	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible] -	[illegible] -	4 100	[illegible] -	-	0	0	0	4
41-60° Unifacial feather	4	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	42.[illegible]	38.[illegible]	1 25.0	0	3 75.0	[illegible]	[illegible]	0	0	0	4
41-60° Bifacial [illegible]	4[illegible]	4[illegible]	[illegible]	11	[illegible]	[illegible]	[illegible]	[illegible]	9[illegible]	25 66.[illegible]	0 -	15 33.[illegible]	1 [illegible]	4 9.[illegible]	[illegible]	8	9	25
41-60° Unifacial step	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	41.[illegible]	[illegible]	2 66.[illegible]	0 -	1 33.3	0 -	-	[illegible]	[illegible]	0	2
41-60° Bifacial step	24	[illegible]	[illegible]	11	[illegible]	[illegible]	[illegible]	64.9	[illegible]	18 [illegible]	1 [illegible]	[illegible] 24.[illegible]	[illegible] -	[illegible]	[illegible]	5	6	15
61-90° Unifacial feather	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	115.4	[illegible]	1 [illegible]	4 [illegible]	-	4 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
61-90° Bifacial feather	[illegible]	[illegible]	1	4	[illegible]	[illegible]	[illegible]	67.5	171.5	[illegible] 65.5	[illegible] -	[illegible] 24.[illegible]	[illegible] -	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
61-90° Unifacial step	[illegible]	[illegible]	[illegible]	[illegible]	11	[illegible]	4	[illegible]	141.[illegible]	[illegible]	2 [illegible]	[illegible]	[illegible]	4 [illegible]	[illegible]	10	5	[illegible]
61-90° Bifacial step	14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2[illegible]3.[illegible]	[illegible] 48.[illegible]	[illegible] -	[illegible] 48.[illegible]	[illegible] -	[illegible] 4.[illegible]	[illegible]	4	5	[illegible]

Un = unifacial; Bi = bifacial; A = convex; B = concave; C = straight; D = recurved; E = sinuous; SP = single platform; MP = multiple platform; BI = bifacial; N = edge-modified [illegible]. All length measurements are in mm; weight is in grams. Entry beneath numerical count for Functional Edge Outline is percent.

TABLE 20

FUNCTIONAL DATA FOR CATEGORIES OF SHAFEL BIFACES AND UNIFACES

Category	No. of Specs.	No. of Edges	Retouch Un	Retouch Bi	Other Scarring Un	Other Scarring Bi	Abrasion	Mean Length of Functional Edge	Mean Weight	Functional Edge Outline A	B	C	D	E	UN	BI	PP
10-40° Unifacial feather	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]		15.0	9.[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10-40° Bifacial feather	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	25.0	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
10-40° Unifacial step	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	26.5	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10-40° Bifacial step		[illegible]															
41-60° Unifacial feather		[illegible]					[illegible]	38.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
41-60° Bifacial feather	[illegible]	[illegible]		[illegible]	[illegible]	4		37.[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	4
41-60° Unifacial step																	
41-60° Bifacial step	[illegible]	[illegible]		4		4		41.[illegible]	4.[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
61-90° Unifacial feather		[illegible]	[illegible]	[illegible]	4		[illegible]	[illegible]	[illegible].4	[illegible]		4		[illegible]	[illegible]	[illegible]	[illegible]
61-90° Bifacial feather	[illegible]	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	44.[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
61-90° Unifacial step		[illegible]	[illegible]	4	4	[illegible]	[illegible]	4[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	4	[illegible]	[illegible]
61-90° Bifacial step		[illegible]															

Un = unifacial; Bi = bifacial; A = convex; B = concave; C = straight; D = recurved; E = [illegible]. All length measurements are in mm; weight is in grams.
UN = unifaces; BI = bifaces; PP = [illegible].

TABLE 21

FUNCTIONAL TOOL CATEGORIES BY RAW MATERIAL TYPE

		Chert	Phyllite	Fine-Grained Quartzite	Sandstone	Basalt	Limestone	Obsidian	Unidentified	Total Specimens
10–40° Unifacial feather	Flakes, chips, angular fragments	9 (39.1)	5 (21.7)	1 (4.3)	1 (4.3)	6 (26.1)	0	0	1 (4.3)	23
	Cores	0	3 (100)	0	0	0	0	0	0	3
	Shaped bifaces and unifaces	1 (100)	0	0	0	0	0	0	0	1
10–40° Bifacial feather	Flakes, chips, angular fragments	81 (64.8)	22 (17.6)	6 (4.8)	0	11 (8.8)	1 (0.8)	4 (3.2)	0	125
	Cores	2 (18.2)	5 (45.4)	1 (9.1)	2 (18.2)	1 (9.1)	0	0	0	11
	Shaped bifaces and unifaces	2 (100)	0	0	0	0	0	0	0	2
10–40° Unifacial step	Flakes, chips, angular fragments	5 (55.6)	1 (11.1)	0	1 (11.1)	2 (22.2)	0	0	0	9
	Cores	0	1 (100)	0	0	0	0	0	0	1
	Shaped bifaces and unifaces	1 (100)	0	0	0	0	0	0	0	1
10–40° Bifacial step	Flakes, chips, angular fragments	10 (40.0)	6 (24.0)	4 (16.0)	1 (4.0)	3 (12.0)	0	1 (4.0)	0	25
	Cores	0	2 (50.0)	0	1 (25.0)	1 (25.0)	0	0	0	4
	Shaped bifaces and unifaces	0	0	0	0	0	0	0	0	0
41–60° Unifacial feather	Flakes, chips, angular fragments	17 (68.0)	3 (12.0)	2 (8.0)	2 (8.0)	1 (4.0)	0	0	0	25
	Cores	2 (50.0)	2 (50.0)	0	0	0	0	0	0	4
	Shaped bifaces and unifaces	1 (100)	0	0	0	0	0	0	0	0
41–60° Bifacial feather	Flakes, chips, angular fragments	61 (59.8)	21 (20.6)	5 (4.9)	7 (6.9)	6 (5.9)	0	2 (2.0)	0	102
	Cores	13 (30.2)	24 (55.8)	0	3 (7.0)	1 (2.3)	2 (4.7)	0	0	43
	Shaped bifaces and unifaces	4 (80.0)	0	0	0	0	0	1 (20.0)	0	5
41–60° Unifacial step	Flakes, chips, angular fragments	20 (54.1)	8 (21.6)	3 (8.1)	1 (2.7)	3 (8.1)	0	2 (5.4)	0	37
	Cores	1 (33.3)	2 (66.7)	0	0	0	0	0	0	3
	Shaped bifaces and unifaces	0	0	0	0	0	0	0	0	0

Table 21, continued

		Chert	Rhyolite	Fine-Grained Quartzite	Sandstone	Basalt	Limestone	Obsidian	Unidentified	Total Specimens
41-60[illegible] Bifacial step	Flakes, chips, angular fragments	13 (56.5)	7 (30.4)	1 (4.3)	0	2 (8.7)	0	0	0	23
	Cores	8 (27.6)	18 (62.1)	0	1 (3.4)	2 (6.9)	0	0	0	29
	Shaped bifaces and unifaces	2 (100)	[illegible]	0	0	[illegible]	0	0	0	2
41-90[illegible] Unifacial feather	Flakes, chips, angular fragments	30 (69.8)	7 (16.3)	1 (2.3)	2 (4.7)	2 (4.7)	1 (2.3)	0	0	43
	Cores	[illegible]	4 (21.1)	2 (10.5)	0		1 (5.3)	[illegible]	0	19
	Shaped bifaces and unifaces	1 (20.0)	1 (20.0)	0	0	2 (40.0)	1 (20.0)	0	0	[illegible]
41-90[illegible] Bifacial feather	Flakes, chips, angular fragments	[illegible] (64.7)	7 [illegible]	0	3 (8.8)	1 (2.9)	0	1 (2.9)	0	34
	Cores	[illegible]	[illegible]	1 [illegible]	4 (13.8)	[illegible]	3 [illegible]	[illegible]	0	[illegible]
	Shaped bifaces and unifaces	4 [illegible]	[illegible]	0	0	[illegible]		[illegible]	0	[illegible]
41-90[illegible] Unifacial step	Flakes, chips, angular fragments	52 (81.3)	[illegible]	2 (3.1)	1 (1.6)	[illegible] (3.1)	1 (1.6)		0	64
	Cores	16 (45.7)	14 (40.0)	1 (2.9)	2 (5.7)	0	2 (5.7)		0	35
	Shaped bifaces and unifaces	4 (57.1)		0	0	[illegible] (28.6)	1 (14.3)	[illegible]	0	[illegible]
41-90[illegible] Bifacial step	Flakes, chips, angular fragments	[illegible]	[illegible]	[illegible]	[illegible]	4 (21.0)	0	[illegible]	[illegible]	19
	Cores	4 (16.7)	18 (75.0)	[illegible]	[illegible] (8.3)	0	0	[illegible]	0	24
	Shaped bifaces and unifaces			[illegible]	0	0	0	[illegible]	0	0

immediately adjacent to the projection tips. These scars have feathered terminations on nine specimens and stepped terminations on one specimen. The patterns suggest that relatively hard materials, such as wood, were not being worked. Eight specimens are of chert, one is of basalt, and one is of obsidian. The small number of items suggests that perforating activities were of minor importance at Site 32.

The vast majority of edge-modified flakes, chips and angular fragments appear to have been used as knives and/or scrapers. Each of the functional edge categories are discussed below.

Edge Angles of 10° to 40°

The relatively small edge angles of these specimens suggest light cutting activities requiring sharp edges. Bifacial feather scarring is the most common form of use wear suggesting that most specimens were used for longitudinal cutting of soft or medium-soft materials. Odell and Odell-Vereecken (1980:101) classify soft vegetal material, meat, skin, fat and some soft woods as soft or medium soft. The step-scarred specimens may have been involved in processing harder materials, such as hard woods or bone. Edges with unifacial step scars are rare and most often also have feather scars. Edge-smoothing and rounding (polish), which often is associated with processing soft materials, was not identified on any of the specimens.

Retouch of the specimen margins is uncommon along edges with small angles. A significantly greater percentage of step-scarred specimens has been marginally retouched (this is true for edges with larger angles as well), and it is possible that some step-scarring identified as use wear actually resulted from chipping of the edges.

Chert is the most common raw material, although relative percentages vary between the groups. Obsidian is present in greater percentages than in groups with steeper edge angles. Sandstone specimens occur very infrequently in the small edge angle groups.

Specimens with small edge angles tend to be small in size (as indicated by mean weight), but functional edges are of moderate length. Straight and convex edge outlines clearly dominate, and recurved edge specimens are present in higher percentages than among the tools with steeper edge angles.

Edge Angles of 41° to 60°

Specimens with edge angles in this range appear to represent tools used for coarser cutting and scraping activities. Edges with bifacial feather scars are most common indicating the importance of longitudinal cutting. Unifacial feather and step-scarred edges are more common than among specimens with smaller edge angles, suggesting that transverse actions such as scraping or whittling are represented.

Marginal retouch, particularly bifacial retouch, is more common than among small edge angle specimens. Functional edges tend to be relatively long except for specimens with unifacial feather scars. The mean weight for most categories is greater than that of categories with either steeper or more-acute edge angles. Percentages of edge outlines and raw material types are similar to those of the smaller edge angle groups.

Edge Angles of 61° to 90°

Unifacial scars, particularly step scars, are most common in this range suggesting that scraping or whittling of relatively hard materials are represented. Retouch is more common than in any of the smaller edge angle categories. Retouch, almost exclusively, is unifacial.

Functional edges tend to be shorter than those with smaller edge angles. Tringham et al. (1974:189) report that use scars from scraping activities tend to be distributed more densely over a smaller portion of the edge than scars from cutting activities. Mean tool weight tends to be smaller than that for groups with 41° to 60° edge angles but larger than that for groups in the 10° to 40° range.

Percentages of edge outline forms differ significantly from smaller edge angle groups. Concave and straight edges are more common while convex edges are less common.

Chert dominates among the raw material types and occurs in greater percentages than among most groups with smaller edge angles. Obsidian and fine-grained quartzite occur infrequently.

Edge-modified Cores

Classification of the edge-modified cores into the functional categories suggests that the two most important activities associated with these tools are coarse cutting and chopping.

Edge Angles of 10° to 40°

Relatively few specimens have edges with angles in this range. Bifacial feather scarring is the most common form of use-wear suggesting fine to medium cutting. Almost all of the specimens in this group are edge-modified nodules. Marginal retouch is common relative to edge-modified flakes, chips and angular fragments with small edge angles. Rhyolite is the dominant raw material type.

Edge Angles of 41° to 60°

Bifacial feather and stepped scarred specimens are most common in this edge angle range. The relatively large percentage of step scars and the relatively large mean weights suggest processing of coarser materials than those processed with edge-modified flakes, chips and angular fragments. The low percentages of unifacial scars suggest that scraping was of relatively minor importance. Edge outlines usually are convex or straight.

Edge Angles of 61° to 90°

Over half of the edge-modified cores have edges with angles in this range. Each of the four categories of use wear are common. Unifacial step scarring appears most frequently. A relatively large proportion of the specimens have multiple forms of use-wear. Abrasion in the form of grinding and rounding of edges is relatively common in all but the bifacially step scarred group. The attribute which varies most significantly from other

tional categories is the very large mean specimen weight figures. Bifacially step-scarred tools especially tend to be large and heavy, suggesting that chopping activities may be represented. *Sinuous edges are relatively well represented in these groups.* McLaughlin (1980:205) suggests that unifacial wear along sinuous edges might represent heavy scraping or shredding activities. Most of the single platform cores have edge angles in this range, although other core types also are present.

Shaped Bifaces and Unifaces

Few of these tools have small edge angles indicative of fine cutting or scraping activities. Cutting appears to be represented by tools with edge angles of 41° to 60° as bifacial feather and step scarring are almost the sole form of use wear. The worn edges are mostly on projectile points, although scarring is not extensive. The majority of projectile points do not have use wear.

Most of the shaped unifaces and bifaces have edge angles of greater than 60°. Scraping may be represented by many of the specimens with unifacial feather and step scars, and coarse cutting by the specimens with bifacial feather scars.

SUMMARY OF TOOL FUNCTION

Table 22 presents a comparison of the number of edges for each combination of edge angles and use-wear scarring. Flake tools refer to edge-modified flakes, chips and angular fragments. Core tools refer to edge-modified cores. Shaped tools are shaped unifaces and bifaces. Bifacial feather scarring is the dominant use-wear pattern suggesting that cutting and sawing were the most frequent actions. *Fine cutting activities (represented by specimens with small edge angles) mainly were carried out using flakes, chips and angular fragments.* Core tools were more important for medium and coarse cutting activities.

Scraping probably is represented by unifacial wear patterns along medium to steep angled edges. Core tools appear to have been of relatively minor importance for scraping activities, although coarse scraping or shredding may be represented by some of the steep angled, unifacially step-scarred specimens.

Overall, step-scarring tends to occur on steep edge angles. Feather-scarring is distributed more evenly among the small, medium and large edge angle classes but occurs somewhat less often on steep edges. This trend is interpreted as indicative of processing different types of materials with tools of different edge angles, but it also possible that steep edge angles may have a greater tendency to step fracture regardless of the type of material processed, or that some of the step-fracturing interpreted as use wear resulted from unsuccessful attempts at margin retouch of steep edges.

In conclusion, functional attributes of the chipped stone tools from Site 32 exhibit a wide range of variability. Projectile points, gravers and perforating tools are not numerous. However, cutting, chopping, scraping and shredding of a variety of materials appears to have been carried out, and activities at Site 32 do not appear to have been limited to the processing of leaf succulents.

TABLE 22

CROSS-TABULATION OF FUNCTIONAL AND TECHNOLOGICAL CLASSES
INCLUDING SUGGESTED ACTIVITIES AND WORKED MATERIALS

Edge Angles	Feather Scars: Unifacial	Feather Scars: Bifacial	Step Scars: Unifacial	Step Scars: Bifacial	Totals
[illegible]-40°	Fine cutting or scraping of soft or medium-soft materials	Fine cutting of soft or medium-soft materials	Fine cutting or scraping of medium to hard materials	Fine cutting of medium to hard materials	Fine cutting or scraping
	Flake tools: 24 (4.3) Core tools: 3 (1.4) Shaped tools: 1 (2.1)	Flake tools: 133 (23.7) Core tools: 11 (5.1) Shaped tools: 3 (6.3)	Flake tools: 9 (1.6) Core tools: 1 (0.5) Shaped tools: 2 (4.2)	Flake tools: 30 (5.3) Core tools: 4 (1.9) Shaped tools: 0	Flake tools: 196 (34.9) Core tools: 19 (8.9) Shaped tools: 6 (12.5)
41-60°	Medium cutting or scraping of soft or medium-soft materials	Medium cutting of soft or medium-soft materials	Medium cutting or scraping of medium to hard materials	Medium cutting of medium to hard materials	Medium cutting or scraping
	Flake tools: 26 (4.6) Core tools: 4 (1.9) Shaped tools: 1 (2.1)	Flake tools: 104 (18.5) Core tools: 45 (21.0) Shaped tools: 8 (16.7)	Flake tools: 37 (6.6) Core tools: 3 (1.4) Shaped tools: 0	Flake tools: 23 (4.1) Core tools: 29 (13.6) Shaped tools: 4 (8.3)	Flake tools: 190 (33.8) Core tools: 81 (37.9) Shaped tools: 13 (27.1)
61-[illegible]	Coarse cutting, scraping or shredding of soft to medium-soft materials	Coarse cutting or chopping of soft to medium-soft materials	Coarse cutting, scraping or shredding of medium to hard materials	Coarse cutting or chopping of medium to hard materials	Coarse cutting, scraping, shredding or chopping
	Flake tools: 45 (8.0) Core tools: 20 (9.3) Shaped tools: 6 (12.5)	Flake tools: 38 (6.8) Core tools: 30 (14.0) Shaped tools: 10 (20.8)	Flake tools: 73 (13.0) Core tools: 39 (18.2) Shaped tools: 13 (27.1)	Flake tools: 20 (3.6) Core tools: 25 (11.7) Shaped tools: 0	Flake tools: 176 (31.3) Core tools: 114 (53.3) Shaped tools: 29 (60.4)
	Soft to Medium-soft Materials		Medium to Hard Materials		Total
	Flake tools: 95 (16.9) Core tools: 27 (12.6) Shaped tools: 8 (16.7)	Flake tools: 275 (48.9) Core tools: 86 (40.2) Shaped tools: 21 (43.8)	Flake tools: 119 (21.2) Core tools: 43 (20.1) Shaped tools: 15 (31.3)	Flake tools: 73 (13.0) Core tools: 58 (27.1) Shaped tools: 4 (8.3)	Flake tools: 562 (100) Core tools: 214 (100) Shaped tools: 48 (100)

NOTE: Entries within parentheses are percentages within technological classes.

Summary

The chipped stone tools from Site 32 are relatively simple in terms of technology but appear to have been utilized in carrying out a diverse variety of activities. Reduction strategies were directed toward the production of usable flakes and cores with a wide range of shapes and edge angles. Specialized forms, as evidenced by carefully shaped tools, are rare. Almost all chipped tools appear to have been made from alluvial and colluvial gravels which were available in the immediate vicinity of the site.

CHAPTER VIII

GROUND, PECKED AND BATTERED STONE ARTIFACTS

Two general goals are pursued in the analysis of the ground, pecked and battered stone artifacts from Site 32. These are: (1) to provide a description of the specimens in the collection, and (2) to elicit information concerning the range and relative importance of activities carried out at the site. Based on types of modification, three artifact classes are recognized: (1) ground, pecked and/or abraded implements; (2) battered implements; and (3) undiagnostic fragments and debitage. The distribution of the artifacts is given in Table 23. Table 24 presents the breakdown by site and raw material type.

Following a brief discussion of the utilized raw materials, each of these artifact classes is described. The distribution of the specimens is then discussed, and implications for interpreting site function are presented.

Raw Materials

Nine raw material types are identified. Four of these (rhyolite, limestone, sandstone and basalt) also are represented in the chipped stone collection and are not described further. The five additional materials are coarse-grained quartzite, gabbro (diabase), micaceous schist, diorite and syenite.

The coarse-grained quartzite differs significantly from the fine-grained quartzite present in the chipped stone collection. In addition to the grains being larger, they also are not as well cemented and often exhibit a jagged or irregular fracture. O'Laughlin (1980:10) reports that quartzite is common in the Franklin Mountains but is more abundant on the alluvial slopes east of the range than on the western side. Quartzites from the Franklins were probably the source for most of the larger ground stone implements at Site 32. Hammerstones are mostly quartzite river cobbles with thick, well-smoothed cortex. These rocks are present in moderate frequencies in the immediate site area. Coarse-grained quartzite was the material most frequently utilized for both ground and battered stone artifacts.

A coarse-grained, dark-colored igneous rock type present in the collection is identified as gabbro or diabase. Diabase has not been reported in artifact descriptions for the El Paso area and is infrequent in the collection. It may have been used only for manos. O'Laughlin (1980:10) reports that diabase is present in small amounts on the eastern alluvial slopes of the Franklin Mountains.

Micaceous schist is a metamorphic rock which has a thin platy structure. Specimens in the collection are pale green or brown and tend to have a slight metallic luster. Micaceous schist is represented only in the form of two pestles and several undiagnostic chips or angular fragments. Schist has been observed in the northern portions of the Franklin Mountains and in the Organ Range ([illegible], personal communication).

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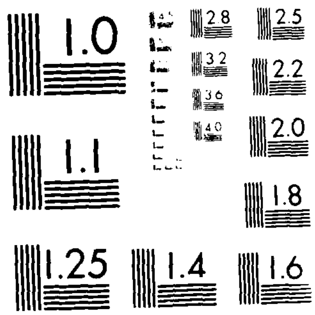

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CHAPTER VIII

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TABLE 23

PROVENIENCE OF GROUND, PECKED AND BATTERED STONE ARTIFACTS

	Surface Collection	Systematic Sample Excavations	Unit 1	Unit 2	Unit 3	Misc.	Total
Manos							
Group 1	1	1	4	2	1	0	9
Group 2	0	1	2	1	0	0	4
Misc.	5	1	2	2	2	1	13
Pestles	0	0	3	2	1	0	6
Metate Frags.	4	1	1	1	1	0	8
Sandstone Abraders	1	0	1	0	0	0	2
Ground and Pecked Frags.	12	1	16	26	3	2	60
Pecked Frags.	0	0	12	12	1	0	25
Hammerstones	50	5	47	21	3	3	129
Anvil Stone	0	0	0	0	0	1	1
Battered Cobble	1	0	0	0	0	0	1
Undiagnostic Frags.	42	2	181	71	13	3	312
TOTAL	116	12	269	138	25	10	570

One broken mano and several undiagnostic fragments in the collection are made of a gray diorite. Pigott and Dulaney (1977:91) report that gray diorite is present in the Jarilla Mountains which protrude from the Tularosa Basin approximately 80 km northeast of the site area.

One intact mano recovered at Site 32 is made from a large cobble of syenite. Syenite outcrops in the Hueco Mountains located along the eastern border of the Hueco Bolson approximately 40 km east of the site area.

TABLE 24

SIZE AND RAW MATERIAL TYPES FOR
GROUND, PECKED AND BATTERED STONE ARTIFACTS

	# of Specimens	Mean Maximum Dimensions (mm)*	Mean Weight (grams)*	Coarse-grained quartzite	Rhyolite	Limestone	Sandstone	Basalt	Gabbro	Micaceous Schist	Diorite	Syenite	Unidentified
Manos													
Group 1	9	123.0	408.4	7	0	0	2	0	0	0	0	0	0
Group 2	4	96.0	872.0	0	1	0	0	0	1	0	1	1	0
Miscellaneous	13	101.7	338.3	4	4	1	0	2	1	0	0	0	1
Pestles	6	319.0	1265.0	1	1	0	0	2	0	2	[illegible]	0	0
Metate Fragments	8	-	-	6	0	2	0	0	0	0	[illegible]	0	0
Abraders	2	110.0	240.5	0	0	0	2	0	0	0	0	0	0
Ground & Pecked Frags.	60	-	-	41	0	2	1	0	10	1	1	0	4
Pecked Fragments	25	-	-	25	0	0	0	0	0	0	0	0	0
Hammerstones	129	64.6	126.7	113	10	2	0	2	0	0	0	0	2
Anvil Stone	1	117.0	967.0	1	0	0	0	0	0	0	0	0	0
Battered Cobble	1	211.0	845.0	0	1	0	0	0	0	0	0	0	0
Undiagnostic Frags.	312	-	-	282	0	3	0	0	10	6	6	0	5

* Fragments not included in calculations

Description of Specimens

Ground, Pecked and/or Abraded Implements

MANOS

Group 1 (9 specs.; Fig. 56a and b)

Group 1 manos are ovoid to subrectangular in outline and relatively thin in cross section. Five complete specimens and four fragments constitute this group. All but one specimen have two flat to slightly convex grinding surfaces. Parallel striations are present on six specimens; striations on two are multidirectional; and no striations could be detected on one fragment. At least one of the two grinding surfaces has been pecked on all of the manos. Margins have been shaped by a combination of pecking and chipping.

Group 2 (4 specs.; Fig. 56c and d)

Specimens of Group 2 have round outlines and are thick in cross section. The grinding surfaces are parallel and the lateral margins are excurvate. Shaping of the margins was carried out by pecking only rather than by a combination of pecking and chipping.

Two complete specimens are represented. The small specimen (Fig. 56d), of rhyolite, has one flat grinding surface and one that is slightly concave. The larger specimen (Fig. 56c), of syenite, has one slightly convex and one slightly concave grinding surface.

The fragments consist of pecked margins with only very small portions of the grinding surfaces present. Striations are not visible on any specimen in this group.

Miscellaneous Manos (13 specs.)

Three complete and ten broken manos are included here. In general the specimens appear to represent cobbles which have been shaped minimally by pecking of the margins. A few of the broken specimens may be representative of Groups 1 or 2, but they are too fragmented for classification.

One of the complete specimens is ovoid in outline and biconvex in cross section. It is made of a rhyolite porpnyry. The margins have been lightly battered or pecked, and both convex grinding surfaces are pecked and ground. No striations are visible.

The second specimen, of limestone, has a roughly rectangular outline and is irregular in cross section. The margins are shaped on three sides, and although it is possible that this specimen represents a portion of a larger artifact, it appears to have been reshaped into a functional form. Parallel striations are visible macroscopically on the slightly convex grinding surface.

The third complete specimen is a small quartzite cobble with an ovoid outline and a lenticular cross section. Both grinding surfaces are slightly convex and have been pecked and ground lightly.

The ten mano fragments all have identifiable grinding surfaces and margins, but classification into more detailed groups is not possible.

PESTLES (6 specs.; Fig. 57a and b)

One complete and five broken pestles were recovered. The complete specimen (Fig. 57a) is of a pale green garnet micaceous schist. The outline is elongated and tapers toward the top. The distal end is chipped and battered, but also is ground smooth along a narrow intact ridge which extends along the rounded end. The specimen has been shaped by grinding and pecking.

The most complete fragment (Fig. 57b) represents the tapered end of a pestle. The tip of this end has been crushed slightly, but is not extensively chipped and battered as is the wide end of the complete specimen. The fragment is made of a copper-colored quartz micaceous schist.

Three of the remaining fragments represent midsections of pestles. All have lenticular cross sections very similar to those of the more complete specimens. Both margins and surfaces have been shaped by grinding and pecking.

The final specimen is classified tentatively as a pestle fragment. It is planoconvex in section and appears to have been split longitudinally. The convex surface is pecked extensively but not ground. The specimen may represent a portion of a pestle broken during manufacture, but this is uncertain.

METATE FRAGMENTS

Eight specimens with ground surfaces appear to represent fragments of metates. The most complete specimen (Fig. 57c) represents the edge of a basin-shaped form. Both the concave upper surface and the flat lower surface have been pecked and ground. The existing outline is slightly excurvate. The outer rim thickness is 34 mm.

A second fragment, also of coarse-grained quartzite, is a complete solid cone with the apex being a battered point and the mouth of the cone representing the concave grinding surface. This surface is pecked extensively. The specimen appears to have been formed by a blow to the underside of the metate which removed a complete Hertzian cone of percussion. Thickness of the fragment is 25 mm.

The third fragment is a large tabular chunk of ferruginous quartzite which was recovered as three separate chunks in the field. Another fragment is of the same material but cannot be fit onto the larger slab. The two grinding surfaces are flat and pecked slightly. Thickness of the fragment is 34 mm.

Two other fragments appear to have originated from one metate, but they cannot be fit together. The grinding surface appears flat, but only a small portion is present.

Another fragment is of a banded dark red and gray coarse-grained quartzite. Two ground and pecked surfaces are present. The upper, and more thoroughly ground, surface is concave indicating that the metate was basin shaped. Parallel striations are visible. The thickness is 31 mm but the thickest portion may not be represented by the fragment.

Figure 56. Manos.

Manos, Group 1

a. Light brown coarse-grained quartzite (Unit 1, N74/W99, Level 1).

b. Dark gray quartzite (Unit 2, N108/W95, Level 5).

Manos, Group 2

c. Mottled light gray diorite (Unit 1, N81/W96, Level 3).

d. Mottled dark red rhyolite porphyry (Unit 2, N113/W100, Level 3).

Artifacts are drawn to one-half size.

Figure 56

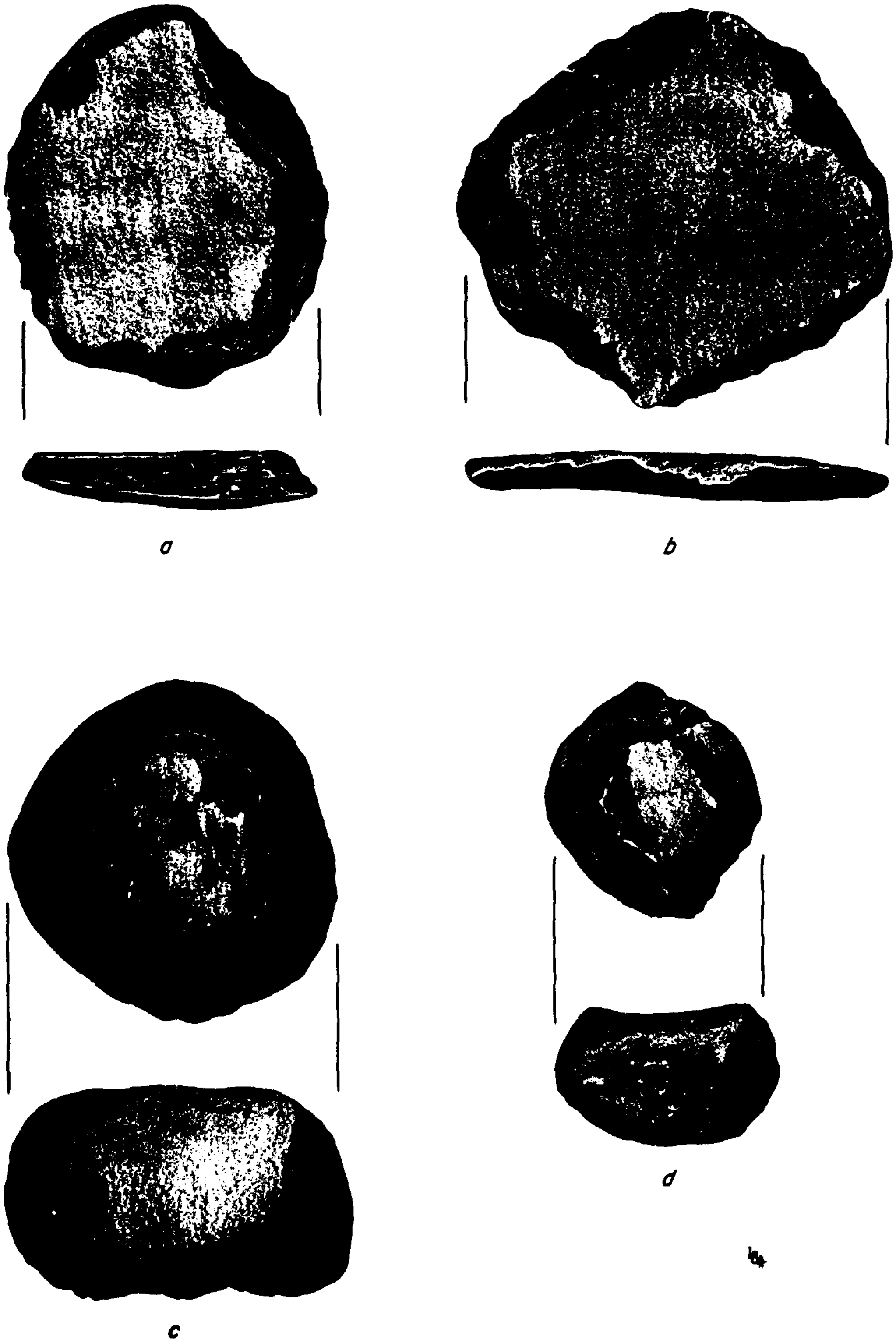


Figure 57. Pestles, Metate Fragment and Sandstone Abrader.

Pestles

a. Pale gray-green garnet micaceous schist (Unit 1, N78/W92, Level 2).

b. Reddish brown quartz micaceous schist (BHT A, Level unknown).

Metate Fragment

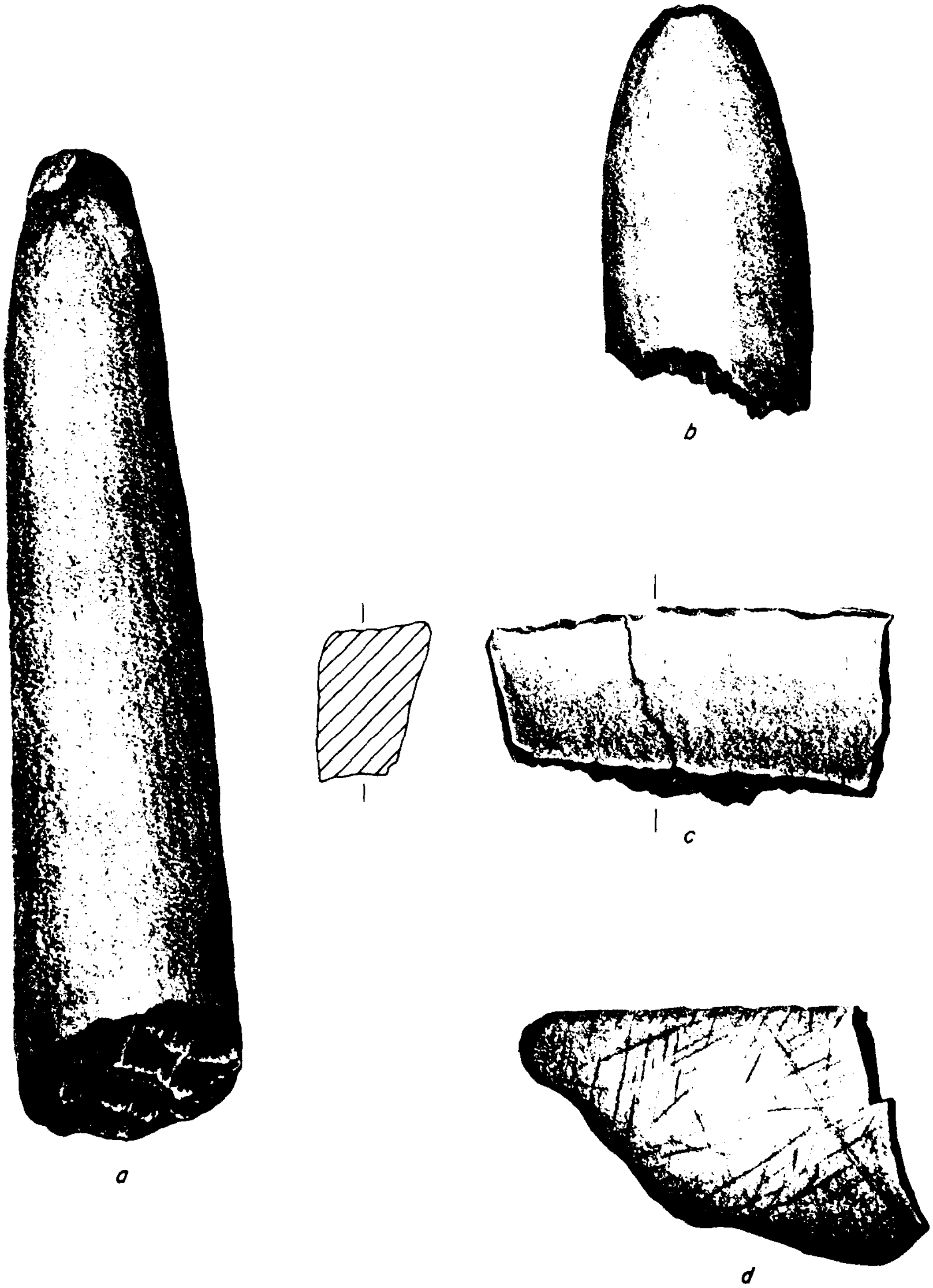
c. Dark gray and red banded coarse-grained quartzite (Unit 1, N77/W95 and N79/W95, Level 2).

Sandstone Abrader

d. Reddish brown sandstone (Unit 1, N76/W95, Level 1).

Artifacts are drawn to one-half size.

Figure 57



The final fragment is a small section of the outer portion of a metate of banded gray coarse-grained quartzite. Two flat grinding surfaces are present. The specimen is 25 mm thick.

SANDSTONE ABRADERS (2 specs.; Fig. 57d)

A flat sandstone slab has multidirectional deep striations or shallow grooves over most of one surface and portions of the opposing surface. Striations also are present along one margin. The surfaces have been lightly pecked or battered.

A second specimen is a thick tabular small sandstone cobble with striations and some battering on one surface. The striations are multidirectional but not as numerous or deep as those on the first specimen.

GROUND AND PECKED STONE FRAGMENTS (60 specs.)

Sixty flakes or angular fragments have grinding and pecking on portions of their surfaces. The modified surface is flat on 47 specimens suggesting that portions of manos or metates are represented. Thirteen specimens have convex pecked and ground surfaces. These may be portions of Group 2 manos, miscellaneous manos or pestles.

PECKED STONE FRAGMENTS (25 specs.)

These fragments have pecked surfaces without visible grinding. It is possible that they represent portions of manos, metates or pestles. These fragments may have originated from along the original specimen margins where grinding often does not occur.

Battered Stone Implements

HAMMERSTONES (129 specs.)

All unchipped cobbles which have battering or crushing on their surfaces are classified as hammerstones (with two exceptions discussed below). The hammerstones almost always are ovoid in outline and cross section, but a few outlines approach subtriangular, quadrangular or irregular shapes. Battering and/or crushing occurs on the ends or along the widest portions (perimeters) of the specimens. On a few, portions of surface areas also are battered.

For each specimen the degree of battering is classified as light, moderate or extensive (Table 25). Light battering consists of relatively few, widely spaced surface fractures. Intensive crushing of surfaces is not visible. Moderately battered specimens have a few small, heavily crushed areas. Small surface fractures are more numerous and more densely spaced. Extensively battered specimens are thoroughly crushed in their modified areas. Since all of the specimens are roughly ovoid in outline and cross section, the location of battering is tabulated as: (1) on a single end only; (2) on opposite ends only; (3) along 50 percent or less of the perimeter; or (4) along more than 50 percent of

TABLE 25

LOCATION AND DEGREE OF BATTERING ON HAMMERSTONES

	Degree of Battering			
Location of Battering	Light	Moderate	Extensive	Total
Single End	14 (31.8)	22 (50.0)	8 (18.2)	44 (100)
Opposite Ends	10 (27.8)	10 (27.8)	16 (44.4)	36 (100)
50 Percent of Perimeter	4 (16.0)	12 (48.0)	9 (36.0)	25 (100)
50 Percent of Perimeter	4 (16.7)	6 (25.0)	14 (58.3)	24 (100)
TOTAL	32 (24.8)	50 (38.8)	47 (36.4)	129 (100)

the perimeter. These data suggest that hammerstones were used in a variety of ways. Specimens with battering over relatively wide areas were not always utilized more extensively. However, there is a slight tendency for hammerstones battered only on a single end to be battered less extensively than those specimens which were used along 50 percent or more of their perimeter.

ANVIL STONE (1 spec.)

One specimen is a coarse grained quartzite cobble with extensive battering restricted to the interior portions of two surfaces. Because the margins and perimeter lack battering, the specimen is interpreted as an anvil stone.

BATTERED COBBLE (1 spec.)

One relatively large rhyolite cobble is battered extensively at one end and along several margins. The elongated outline and large size of this specimen are suggestive of a crude pestle.

Coarse-grained Debitage (312 specs.)

All flakes, chips and angular fragments of very coarse-grained materials are tabulated separately from the chipped stone. These raw materials all are represented in the ground, pecked and battered stone collection, but none are in the collection of chipped stone tools. Therefore, it is probable that these specimens resulted from the manufacture, maintenance or use-damage of ground, pecked and battered stone implements.

Distribution

The distribution of the ground, pecked and battered stone specimens is shown in Figures 56 through 63. These artifacts are widely scattered over the site surface but are relatively concentrated in the northern one-half of the central site area. This distribution differs from that of the unmodified debitage (see Fig. 39) and is similar to the distribution of scattered fire-cracked rocks (see Fig. 13). As discussed in Chapters VI and XI, the high density area of fire-cracked rocks in the northern part of the site appears to be an outcropping of the dense subsurface rock scatter in the southern portion while the surface debitage distribution appears largely to reflect site use post-dating the accumulation of the dense rock scatter. The distribution of the ground, pecked and battered stone specimens suggests that this class of artifacts is most heavily associated with the occupations which resulted in the dense scatter of fire-cracked rocks at the site.

This conclusion is supported by the vertical distribution of these items in Units 1 and 2. Figures 59, 60, 62 and 63 show that ground stone and battered stone artifacts are relatively concentrated in Level 3 (45.5 percent) when compared to the unmodified chipped stone debitage (26.5 percent). This suggests strongly that while ground, pecked and battered stone artifacts were manufactured and/or maintained and used throughout the site occupation, they were a more important part of the tool kit during the middle zone occupation of Unit 2 and the lower zone occupation of Unit 1.

Discussion

Although this collection is small, it offers a great deal of information on activities carried out at the site. The manos, metates and pestles suggest that seed processing was of some importance to the site's inhabitants. Just as significantly, the ground stone debitage and the possible pestle manufacturing failure indicate that some tool manufacture and/or maintenance was carried out. The distributional co-occurrence of the ground and pecked stones and the battered stones suggests that hammerstones were used in this manufacturing or maintenance. This range of activities (i.e., manufacturing or maintenance as well as tool use) seems to hint that the site may have been used as a general purpose campsite rather than a special processing locale.

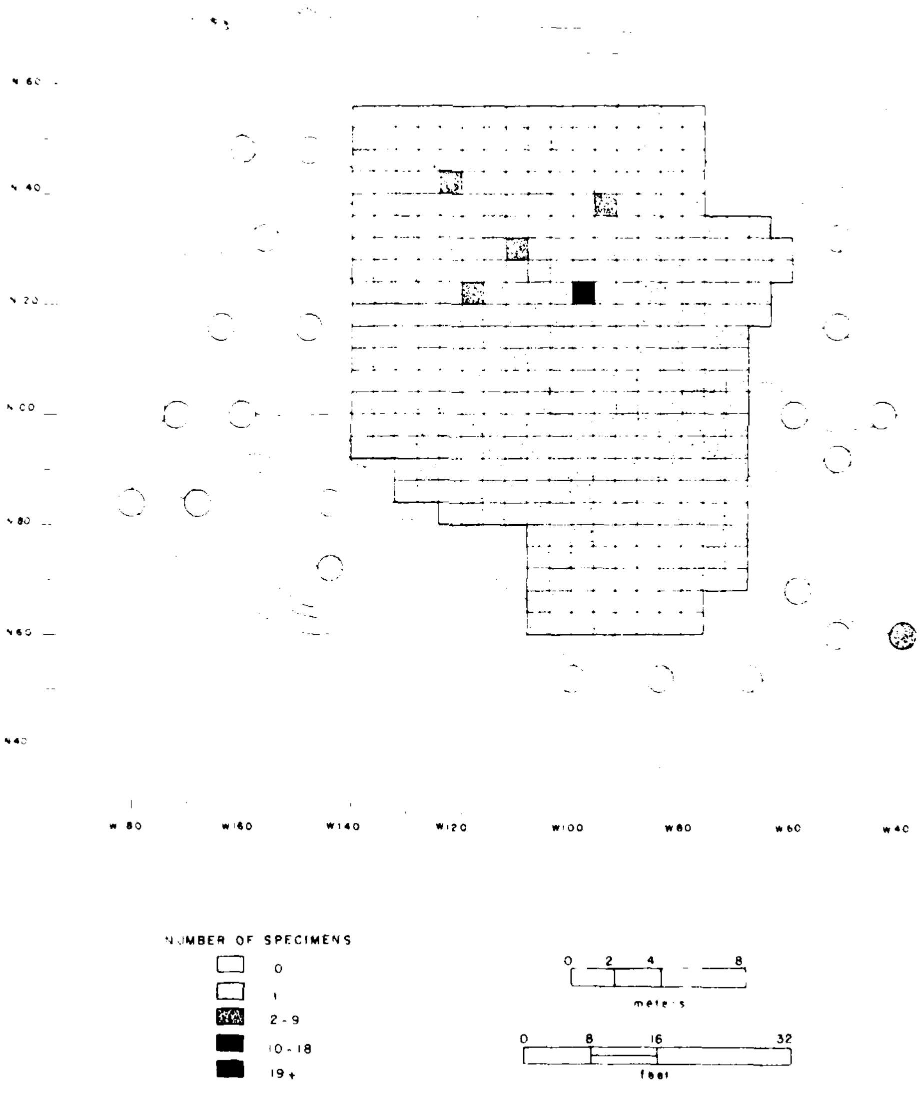
O'Laughlin (1979, 1980) has attempted to differentiate between residential sites and campsites on the basis of relative percentages of categories of chipped and ground stone artifacts at a number of sites in the project area. He suggests that high percentages of ground stone tools relative to total tools indicate the importance of grinding activities and that low percentages of ground stones relative to total artifacts indicate the curation and maintenance of ground stone tools. Under this scenario, he interprets the low frequency of ground stone tools in Formative period contexts at Sites 33 and 34 as reflecting the unimportance of grinding activities. The low frequency of these tools in Archaic period contexts at Site 33 is then seen as reflecting tool curation. Viewed in this same way, the Site 32 data from the systematic sample units (Table 26) seem to suggest that grinding activities were as important at Site 32 as for the Archaic component at Site 33.

Figure 58

KEYSTONE DAM PROJECT

SURFACE COLLECTIONS

DISTRIBUTION OF BATTERED STONES

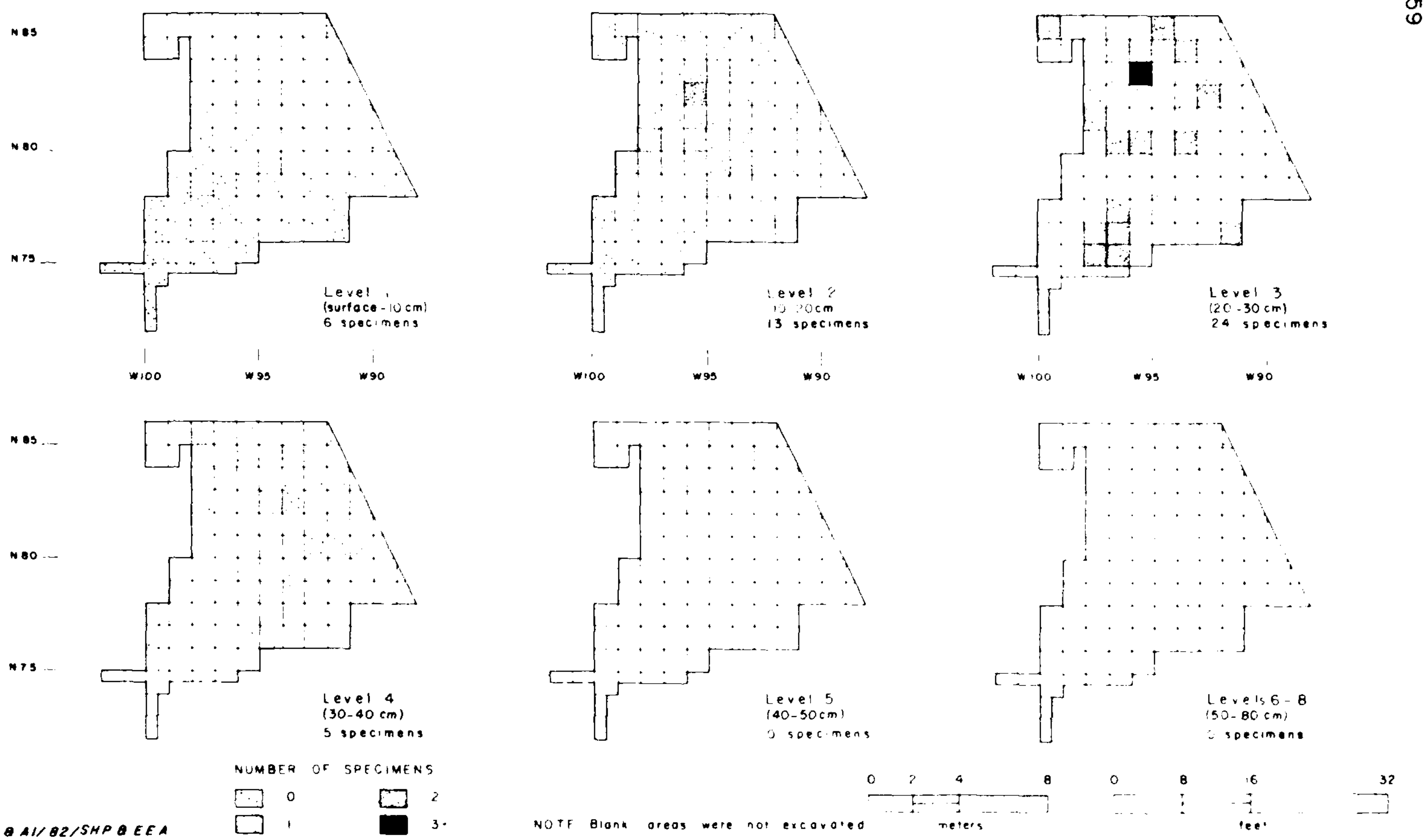


NOTE Blank areas were not collected

P B A1/82/SHP B EEA

Figure 59

KEYSTONE DAM PROJECT
UNIT I
DISTRIBUTION OF BATTERED STONES



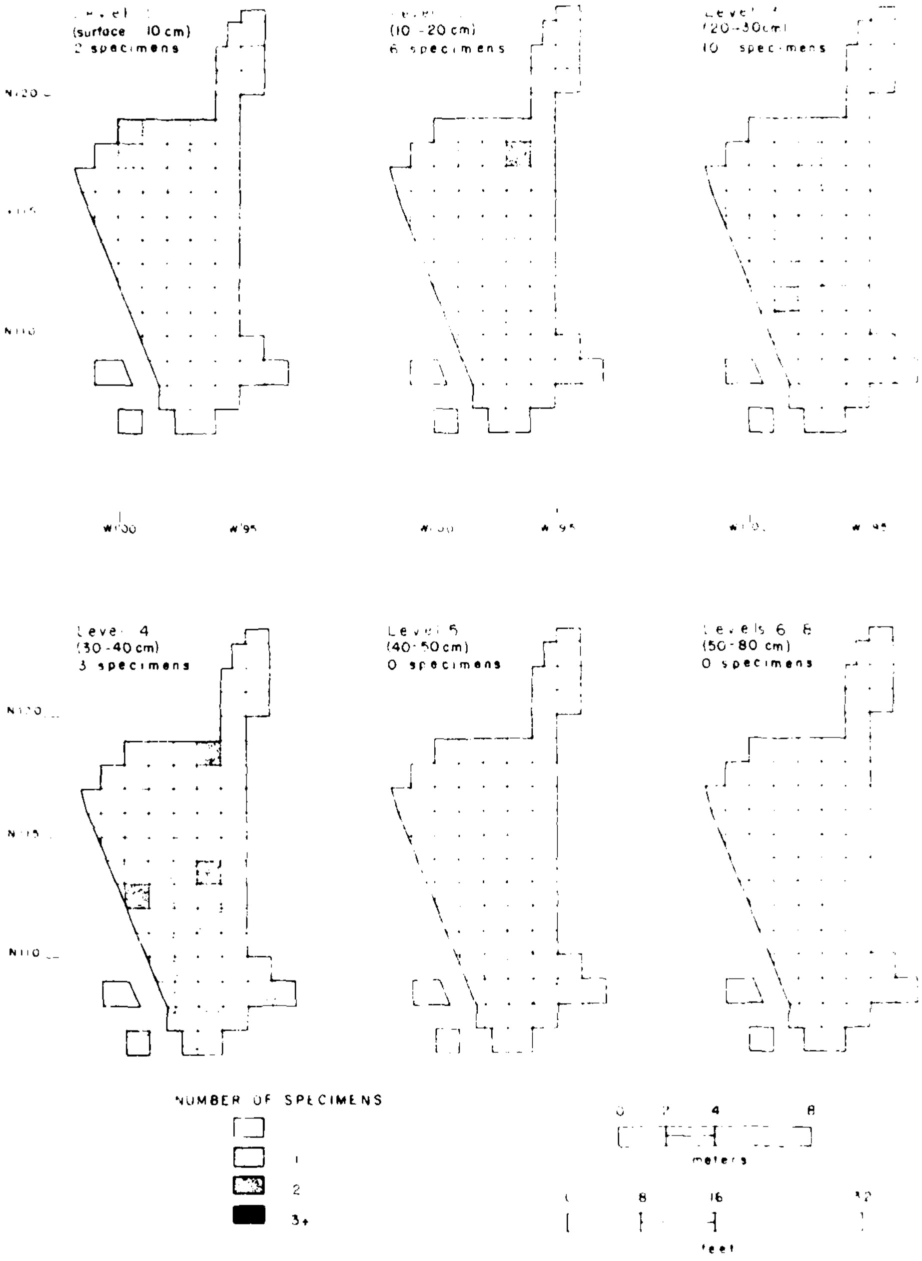
P B A1/82/SHP B EEA

Figure 60

KEYSTONE DAM PROJECT

UNIT 2

DISTRIBUTION OF BATTERED STONES



NOTE Blank areas were not excavated

P BAI/82/SHP B E F A

Figure 61

KEYSTONE DAM PROJECT

SURFACE COLLECTIONS

DISTRIBUTION OF GROUND & PECKED STONES

NOTE Blank areas were not collected

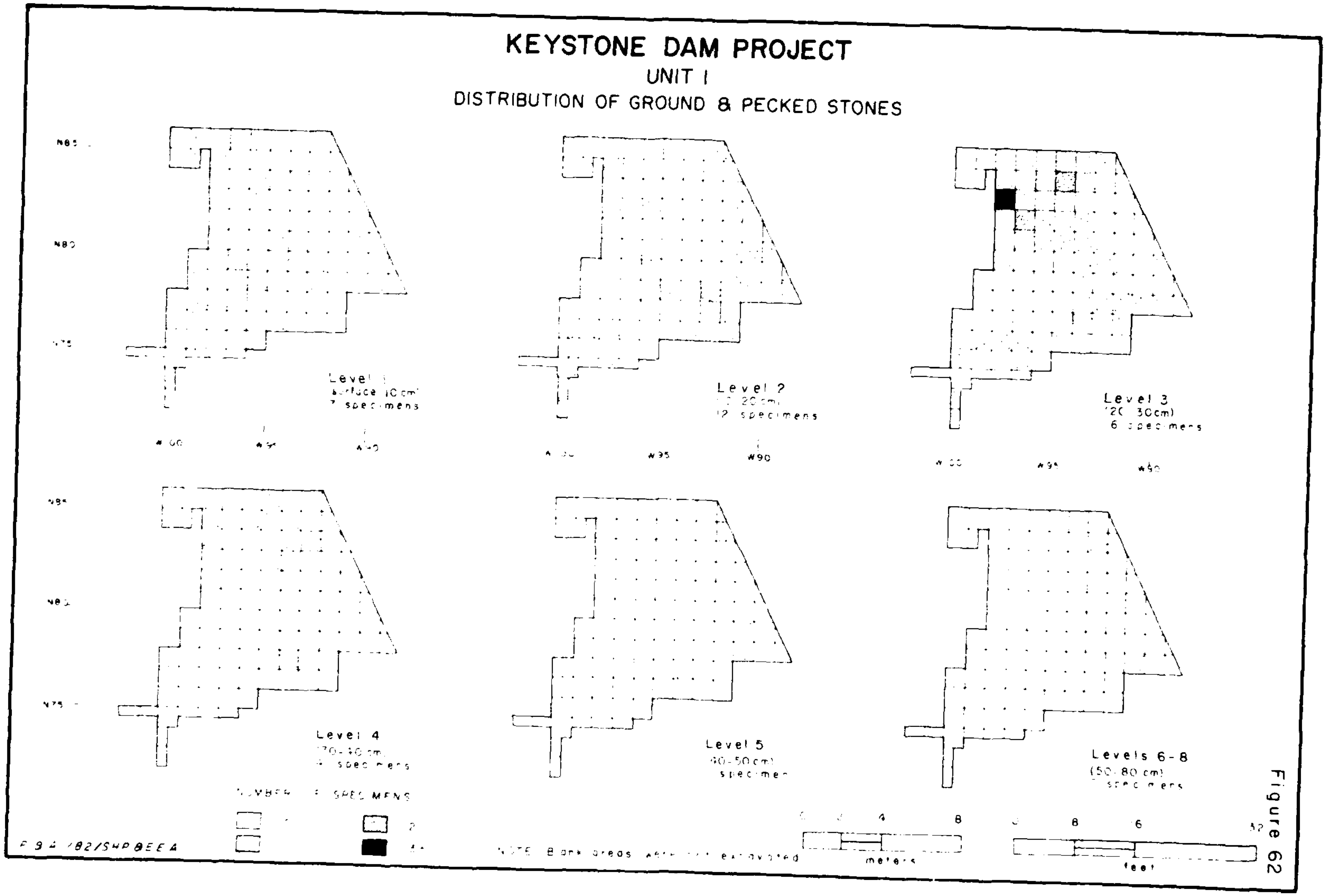

KEYSTONE DAM PROJECT
UNIT I
DISTRIBUTION OF GROUND & PECKED STONES
N85
N80
N75
Level 1
surface 10cm
7 specimens
Level 2
20cm
12 specimens
Level 3
(20 30cm)
6 specimens
W100
W95
W90
Level 4
Level 5
specimen
Levels 6-8
(50-80 cm)
specimens
NUMBER OF SPECIMENS
2
meters
feet
4
8
6
F 9 A /82/SHP BEE A
Figure 62

TABLE 26

COMPARISON OF RELATIVE ABUNDANCE OF GRINDING TOOLS
AT SITE 32 AND SITES 33 AND 34

	Site 32	Sites 33 & 34 Formative period	Site 33 Archaic period
No. of Ground Stone Tools	4	14	3
Percent of Total Chipped and Ground Stone	0.5	0.5	0.7
Percent of Chipped and Ground Stone Tools	10.8	6.4	11.5

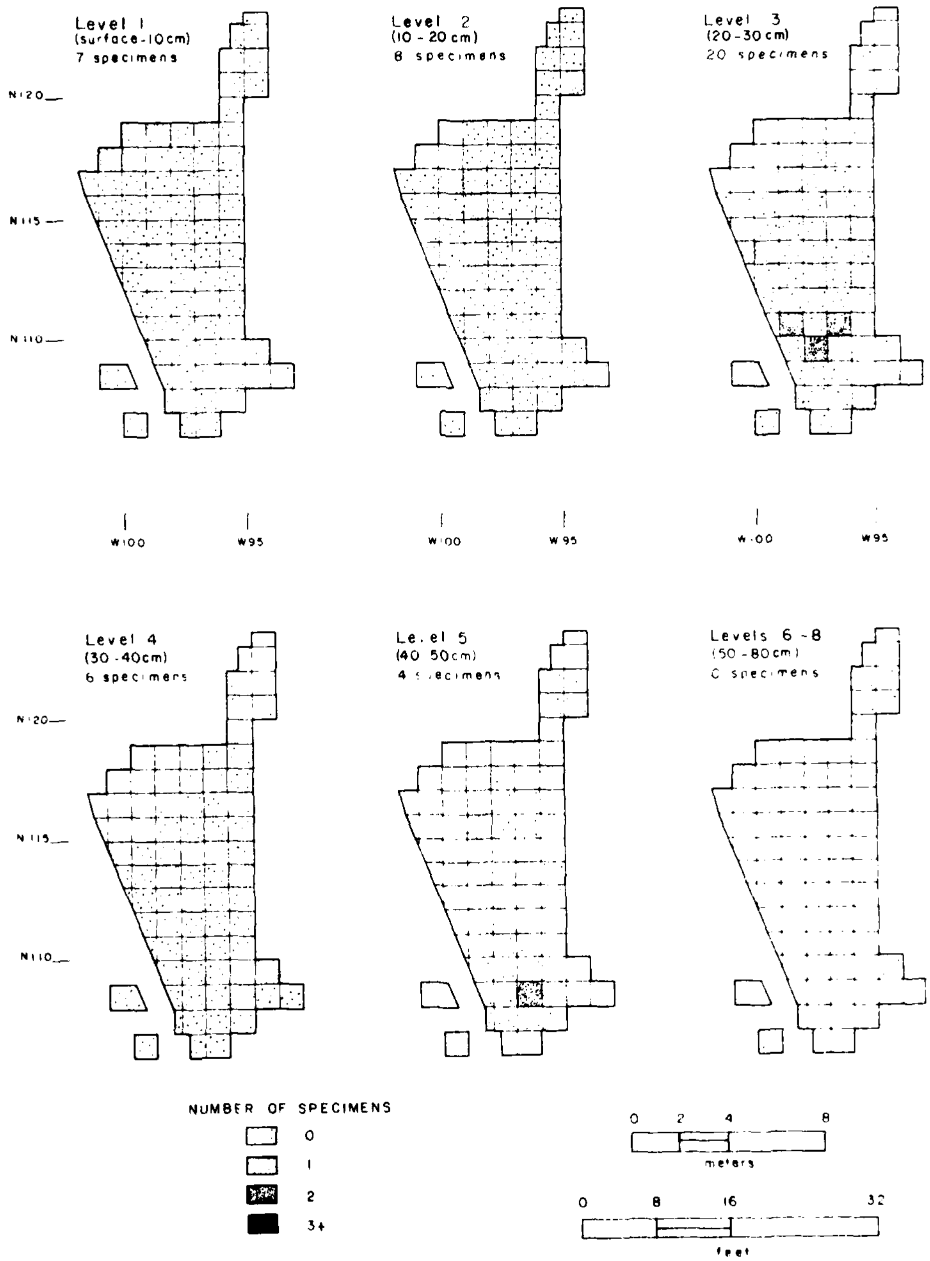
The distribution of these specimens indicates that grinding activities were relatively important during the early part of the site history. As discussed in Chapter XI, this conclusion forms a part of the basis for contending that site function changed significantly during the Archaic period.

Figure 63

KEYSTONE DAM PROJECT

UNIT 2

DISTRIBUTION OF GROUND & PECKED STONES



NOTE Blank areas were not excavated

P & AI/82/SHP & EEA

CHAPTER IX

CERAMICS

This chapter describes the 96 sherds recovered from Site 32 and examines their distribution. The research topics are then addressed using these data. Although the ceramic collection is small, its homogeneity and restricted distribution make it quite informative.

Description

All of the sherds found at the site are undecorated brownware and all but four are assigned to the type El Paso Brown (O'Laughlin 1980; Whalen 1980; Runyan and Hedrick 1973; Lynn, Baskin and Hudson 1975). Many of the specimens are small (mean weight = 4.6 g) and have badly weathered surfaces.

A single rim sherd is included in the collection; the remainder are body sherds. The rim sherd is from a short-necked jar with a restricted orifice and an approximate rim diameter of 28 cm.

Interior and exterior surfaces are smoothed and not polished with the exterior surfaces generally being more finely finished than the interior ones. Most of the sherds have gray to black cores and all have yellowish red (5YR 4/6) to dark brown (7.5YR 4/2) exterior surfaces (Munsell Color Company 1975). Interior surface colors usually fall within the range given above but often are of lower value than the exterior surfaces. Some interior surfaces (n = 6) are gray to black, but this appears to be the result of firing rather than the addition of some organic substance to the vessel walls.

Although no attempt has been made to identify specific tempering agents through a petrographic analysis, it is clear that all vessels represented in the collection are tempered with sand (each specimen was examined using a variable power binocular microscope). Petrographic analyses of ceramics from other sites in the El Paso area indicate that the temper in El Paso Brown consists mostly of quartz and feldspars and constitutes 25 to 50 percent of the body (Smiley 1977:273-274). Fine- to medium-grained sand (0.10-0.50 mm) is noted in all sherds from Site 32, and most specimens contain large amounts of coarse to very coarse sand (grains averaging 1.0 mm in diameter). Four sherds are conspicuous in their lack of coarse-grained sand temper. These four are assigned tentatively to the type Alma Plain (O'Laughlin 1980; Haury 1936; Smiley 1977). Sherd thickness for all specimens ranges from 4.0 to 7.8 mm and averages 5.8 mm. None of these sherds is modified.

Distribution

Ceramics at Site 32 are restricted in distribution both horizontally and vertically (Table 27). By far the majority (n = 64) are from 15 surface collection units scattered over am 1120-m^2 area covering the north-central part of the site (Fig. 64). Only three

TABLE 27

PROVENIENCE OF SHERDS

	El Paso Brown	Alma Plain (?)	Totals
Surface Collection	65 (70.7%)	2 (50.0%)	67 (69.8%)
Unit 2			
Level 1	13 (14.1%)		13 (13.5%)
Level 2	6 (6.5%)		6 (6.2%)
Level 3	4 (4.3%)		4 (4.2%)
Level 4	1 (1.1%)		1 (1.0%)
TOTALS	24 (26.1%)		24 (25.0%)
Phase I Testing (Level 1)	1 (1.1%)	1 (25.0)	2 (2.1%)
Sample Excavations (Level 1)	1 (1.1%)	1 (25.0%)	2 (2.1%)
Surface Feature Excavation (Level 1)	1 (1.1%)		1 (1.0%)
TOTALS	92 (100%)	4 (100%)	96 (100%)

sherds are from surface collection units outside of this area, two from a square on the eastern edge of the contiguous surface collection squares and one from a square near the southeastern edge. Of the 67 specimens in the surface collection, 42 (62.7 percent) are from one 8-by-8-m area.

A similar horizontal distribution is shown by ceramics recovered during the excavations. Unit 2 yielded 25 percent of the sherds from the site while the block unit to the south, Units 1 and 3, yielded no ceramics at all. The only excavations other than Unit 2 which contained sherds were two Phase I test pits (N92/W92 and N106/W99), two sample excavation units (N100/W84 and N100/W68), and one surface feature trench (N132/ W121; Feature 8). All of these excavations are within or adjacent to the area containing most of the surface ceramics.

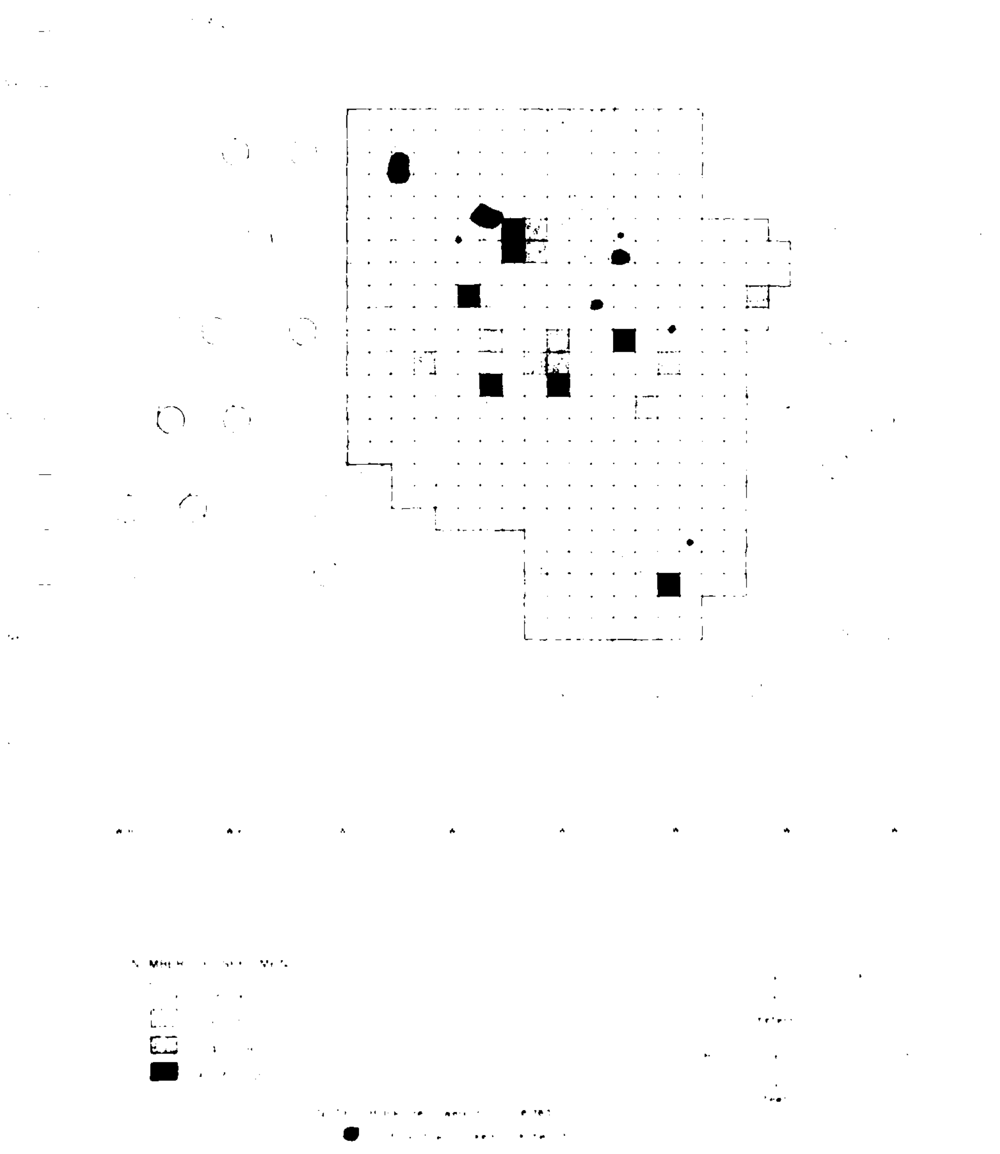
This artifact class occurred most frequently, quite obviously, on the surface of the site. Of the 29 sherds recovered in the excavations, 24 (82.8 percent) are from Levels 1 and 2 (to 20 cm below surface). Of the five specimens found at depths greater than 20 cm, four were clearly within animal disturbances. Four of the five 1x1-m squares in Unit 2 which had sherds in Levels 3 or 4 also yielded sherds from Levels 1 and/or 2 or were next

Figure 64

KEYSTONE DAM PROJECT

SURFACE COLLECTIONS

DISTRIBUTION OF CERAMICS



to squares with sherds in the upper levels (Fig. 65). In short, the occurrence of ceramics below Level 2, and possibly much of that in Level 2, appears to be the result of downward displacement from the surface and upper 10 cm of the site soils.

Discussion

Although it is often difficult to assign brownware body sherds to a particular type, those recovered from Site 32 can be typed with some confidence as El Paso Brown and Alma Plain because of the lack of decorated specimens (i.e., El Paso Polychrome) from the collection. Both El Paso Brown and Alma Plain, however, were used over a very long period of time, from about the time of Christ to A.D. 1100 (O'Laughlin 1980; Whalen 1980), and thus the sherds at the site could have been deposited any time during the approximately 1100-year-long Mesilla Phase.

In an effort to refine the typology of the El Paso brownwares, Whalen (1980) recently conducted a study of ceramic attributes using data collected mostly from surface contexts in the Hueco Bolson, east of the Franklin Mountains. His analysis focuses on changes through time in rim and lip form, vessel wall thickness, and vessel size. Using these attributes, Whalen defines early and late forms of El Paso Brown although, as he points out, much work remains to be done before the changes are fully understood. The principal differences between the early and late forms seem to be: (1) a shift from a pinched lip to a flattened lip; (2) an increase in vessel size (mean rim diameter changes from 13.2 to 17.0 cm); and (3) a decrease in vessel wall thickness (5.6 vs. 5.0 mm) (Whalen 1980:31).

Unfortunately, the Site 32 ceramics cannot be compared very comfortably with the Hueco Bolson data. The single rim sherd has a lip which is somewhere between pinched and flattened, and the orifice diameter indicated by this rim sherd is considerably larger than both of Whalen's mean rim diameters. Although the mean thickness of the Site 32 sherds compares favorably with that for Whalen's early El Paso Brown, it seems risky to rely on this as a chronological indicator in view of the small sample sizes involved. Nonetheless, the co-occurrence of El Paso Brown and Alma Plain, both of which appeared in the early Formative period, and the lack of any local or nonlocal decorated ceramics seem to suggest that the ceramic component at Site 32 represents occupation during the early part of the Mesilla Phase. The single Mesilla Phase radiocarbon date from Site 32, A.D. 520 ± 70, does not contradict this conclusion. That this Mesilla Phase component represents the late end of the use of Site 32 is indicated by the very high percentage of sherds that came from the surface and upper 20 cm of the site. It is clear that the most intensive use of the site occurred in pre-Mesilla Phase, or Archaic, times.

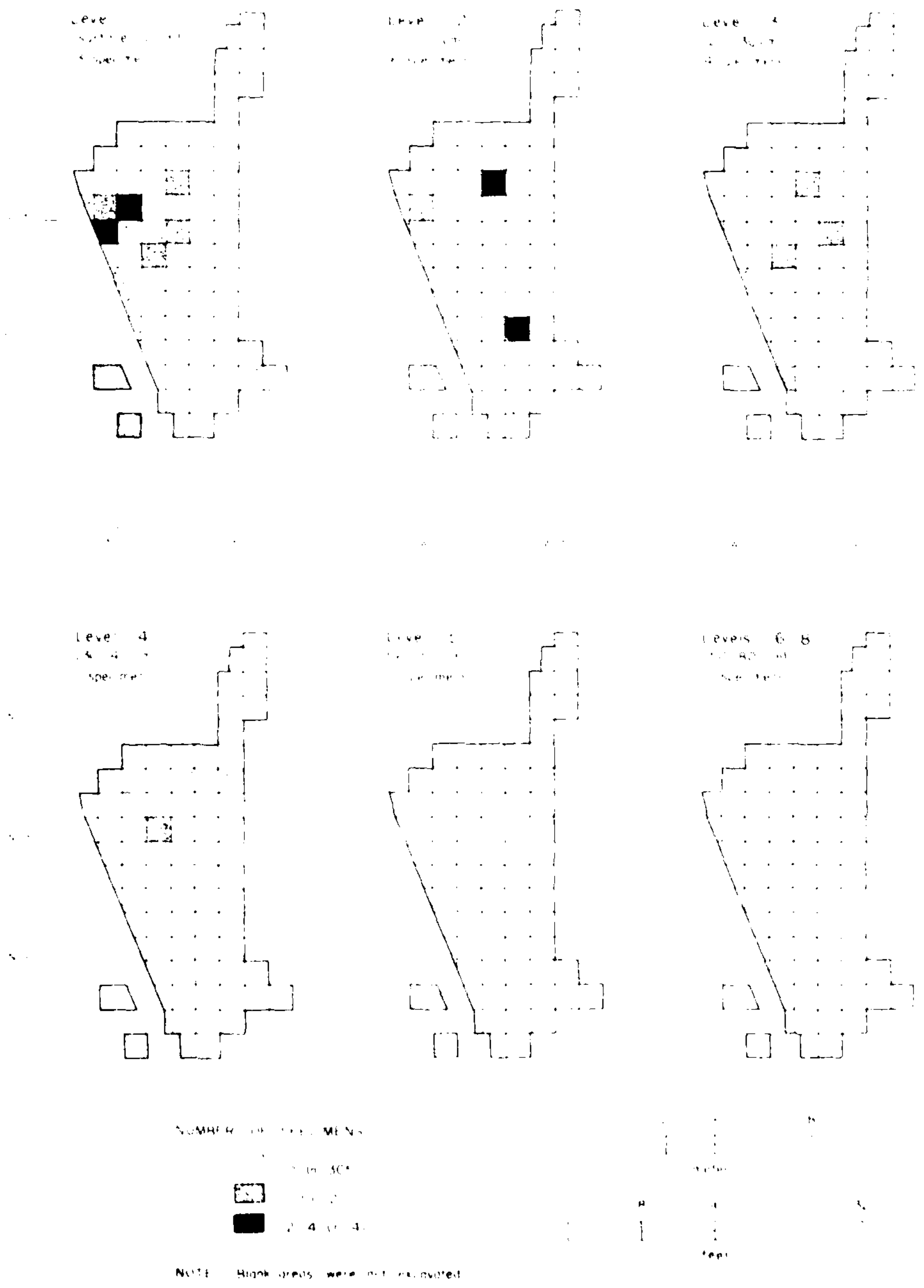
The horizontal distribution of the ceramics provides some insight into the nature of this early Mesilla Phase component. It is suggested, based on the small number of sherds collected and their discontinuous distribution, that this component represents short-term occupation by one or more small groups of people. Whether this component represents one occupational episode or many is not known. That the ceramics occur over such a small part of the site seems to suggest some continuity of use -- a continuity which could reflect one episode or a few closely spaced episodes. On the other hand, the discontinuous nature of the surface distribution suggests that multiple, unconnected occupations may have occurred. The small number of sherds on the surface and the fact that most occur in two discrete concentrations certainly suggest that the total number of occupational episodes could not have been very large.

Figure 65

KEYSTONE DAM PROJECT

UNIT 2

DISTRIBUTION OF CERAMICS



The question of site function for the Mesilla Phase component is dealt with elsewhere in this report, but it is noted here that most of the surface ceramics occurred near a large surface feature (Feature 9) which has been interpreted as one or more deflated hearths, that five other surface features (Features 1, 8, 13, 14 and 15) assessed as hearths or hearth remnants occur in the part of the site containing most of the surface ceramics, and that at least one (Feature 21), and possibly two (Feature 31), of the rock hearths found in Unit 2 belong with the Mesilla Phase component. Although the function of rock hearths remains problematical (see Chapter VI), it has been suggested that they were used in the processing of leaf succulents, and it thus seems likely that this was an important activity during Mesilla Phase times. Whatever other activities may have occurred at the site during that time, it seems quite clear, once again based on the density and distribution of the sherds, that they were not sufficient in range or duration for Site 32 to have been used on a long-term basis. That these proposed brief occupations may have been by small social groups exploiting a variety of resources rather than by an organized task group intensively exploiting a small number of resources (i.e., pit-baking of leaf succulents) is suggested by the lack of very large fire-cracked rock hearths attributable to Mesilla Phase occupations.

CHAPTER X

SPECIAL STUDIES

This chapter summarizes the results of four analyses -- radiocarbon dating, macrobotanical, palynological and faunal. Sampling strategies, collection methods, and processing methods are discussed in Chapter V. Full reports on the macrobotanical and palynological studies are included as Appendices B and C to the report.

Radiocarbon Dating

Only four of the thirteen radiocarbon samples collected contained sufficient amounts of woody charcoal for dating. One of these four was not submitted because it was a composite of several samples and was from a context with low interpretability. Table 28 presents the provenience information, laboratory number, uncorrected radiocarbon age with a one-sigma standard deviation (half-life = 5568 years), stable carbon isotope ratio, C-13 adjusted age, and C-13 and dendrochronologically corrected (Damon et al. 1974) calendrical date for each sample. The significance of these dates is discussed in Chapter VI. In summary, they show that Site 32 was occupied over a long period of time in the late Archaic and early Formative periods, and they provide rough chronological limits for the main occupational periods. They are also employed in estimating when eolian deposition commenced at the site (see Chapter III).

TABLE 28

RADIOCARBON DATES

	Feature 27 Fill	Feature 32 Fill	Feature 21 Fill
Laboratory number	Beta 4886	Beta 4887	Beta 4885
Radiocarbon age years B.P. (1950)	3650 ± 85	2465 ± 60	1375 ± 70
C-13/C-12 per mil	-24.27	-23.56	-20.09
C-13 adjusted age	3660	2490	1455
Calendrical date C-13 and dendro-corrected	2160 B.C. ± 160	650 B.C. ± 120	A.D. 520 ± 70

Macrobotanical Remains

The only botanical remains found were those recovered in the flotation samples. Flotation sampling was intended primarily to provide information on feature function, and the samples collected represent a variety of feature and nonfeature (for control samples) contexts. Recognizing that the preservation of organic materials was very poor at the site, a group of 11 samples was selected for a pilot study to explore the information yield potential of this line of research. Five of these are from intact features (F-5, 21, 27, 31 and 32); four are from on-site nonfeature contexts (control samples); and two are off-site control samples. Analysis of the remainder of the flotation samples was to be dependent on the results of the pilot study.

The only prehistoric botanical remains found in the pilot study sample is charcoal from Feature 32. This charcoal is nonconiferous but cannot be specifically identified. The other botanical remains identified are seeds of annual weeds and cacti, creosotebush fruits, Eriogonum flowers, and compositae achenes. All are unburned and clearly modern. Modern disturbance of the sampled contexts is further shown by the numerous rootlets, insect parts and scats found and the occurrence of a seed of an historically introduced species, Russian thistle, in Feature 5.

It is obvious that poor preservation and modern disturbance at Site 32 make the use of flotation samples for the study of feature function virtually useless. These results, coupled with O'Laughlin's (1980) equivocal results from flotation sample analysis at Sites 33 and 34, suggest that this kind of research by and large has a low information yield potential for open sites in the El Paso area. Because of these negative results, the second phase of the flotation sample analysis was not undertaken. The pilot study provides ample proof that further analysis is not warranted.

Palynological Analysis

Pollen sampling was intended to provide information on feature function and paleoclimate. The sampling scheme closely followed that for the flotation studies with samples coming from intact subsurface features and both on-site and off-site stratigraphic columns. Because pollen preservation was expected to be poor, a group of 11 samples, from the same proveniences as the 11 analyzed flotation samples, was chosen for a pilot study. Analysis of the remaining samples was to be dependent on the results of the pilot study.

Of these eleven samples, only two contained sufficient pollen to reach counts of 100 grains. Both of these samples are nonfeature control samples. Most of the pollen identified represents cheno-ams, graminae and Pinus sp. In Appendix C, Cully concludes that poor preservation of pollen and modern contamination preclude use of the Site 32 samples for study of resource utilization and paleoenvironmental conditions. Thus, as with the flotation samples, this pilot study shows that a second phase of analysis is not warranted.

Faunal Remains

Table 29 lists the faunal remains recovered. By far, most (ca. 84 percent by weight) are unburned, and most of these are recent intrusions. This obviously recent material represents primarily small to medium mammals (rodents and/or rabbits ?), but the one probable deer tooth fragment found on the site surface is likely also of recent origin.

The culturally significant faunal remains include one Olivella shell which was fashioned into a bead, one freshwater drum otolith, one possible buffalo fish operculum, one burned jackrabbit innominate fragment, and a very small amount of burned bone identified mostly as representing small and large mammals. This collection is quite meager, probably largely because of poor preservation. But, these remains may be scarce also because hunting played a small role in the subsistence systems of the site's inhabitants (O'Laughlin 1980:93-94).

In terms of hunting patterns, the freshwater drum and buffalo fish bones indicate use of the Rio Grande, and the jackrabbit bone suggests hunting in open areas away from the floodplain. The bones identified as representing large mammals may be from antelope or deer. It has been suggested (Chapter III) that the former would have been most abundant on the bajada slopes east of the site and that the latter could have been most easily hunted in the Franklin Mountains. The small mammal remains probably represent cottontails and/or jackrabbits. In short, these remains suggest that mammals and fish were taken from at least two and possibly three of the environmental zones defined for the project area (Chapter III).

The horizontal and vertical distributions of these specimens are difficult to evaluate because of the small sample size. That most of the remains are from the lower levels in Units 1 and 2, however, suggests very tenuously that hunting may have played a more important role during the occupations which resulted in the dense accumulation of dispersed fire-cracked rocks in these units than in later terminal Archaic and early Formative occupations.

The nonlocal Olivella shell bead is the only modified item recovered from the site which was not of stone or clay, and it is the only artifact classifiable as an ornament. The bead, which is 2.5 cm long, was made by removing the tip of the shell spire. Its provenience suggests that this item relates to a terminal Archaic or early Formative occupation.

TABLE 29

FAUNAL REMAINS

Provenience	No. of Pieces	Weight (grams) Burned	Unburned	Identification
Surface	4	.39	-	Unidentified
	1	-	.09	Tooth fragment; probably Odocoileus sp. (deer)
Unit 1:				
Level 1	2	.54	-	Long bone fragments; probably large mammal
Level 2	1	-	.29	Unidentified; small mammal
	50	-	15.66	Long bone fragments; medium mammal
	2	.14	-	Probable operculum; possibly Ictiobus sp. (buffalo fish)
	1	-	-	Land snail shell
Level 3	2	.25	-	Unidentified; small mammal
	21	-	1.87	Long bone and metapodial fragments; possibly rodent
	1	-	-	Land snail shell fragment
Level 4	4	.28	-	Long bone fragments; small mammal
Unit 2:				
Level 1	1	-	-	Olivella shell (modified)
Level 3	1	.40	-	Calcined long bone fragments; small mammal
Level 4	1	.08	-	Long bone fragment; small mammal
	1	.37	-	Innominate fragment; Lupus californicus (jackrabbit)
Level 5	1	.84	-	Epiphysis; large mammal
Other Excavations:				
Level 1	1	-	.07	Unidentified; small mammal
	1	-	.75	Skull fragment; small mammal
	7	-	-	Land snail shell fragments
	1	-	-	Otolith; Aplodinotus grunniens (freshwater drum)
Level 2	-	-	-	Land snail shell fragments
Level 5	1	.08	-	Unidentified
TOTAL BURNED:	19	3.37 g		
TOTAL UNBURNED:	86	18.13 g		

CHAPTER XI

DISCUSSION OF SITE OCCUPATIONS

This chapter uses the Site 32 data to: (1) define components; (2) study the range of activities being performed at the site for each component; and (3) make inferences about how the site fits into subsistence and settlement systems.

Four periods of occupation are definable at Site 32. For this discussion, these are called components and are numbered from earliest to latest. These components are the only consistently observable units of time in the data; however, the radiocarbon dates from Site 32, the thickness of the deposits, and the dispersed vertical distribution of artifacts and fire-cracked rocks clearly suggest that each component represents multiple occupational episodes and covers a long period of time. Components 1, 2 and 3 are assignable to the Archaic period; Component 4 refers to Formative period occupations.

The first three components are defined by variability in the vertical distribution of fire-cracked rocks in the block excavation units. Specifically, Units 1 and 2 have zones with dense rock scatters which overlie and underlie zones with sparse rock scatters (see Appendix F for provenience units assigned to each component). Because the zones differ substantially, a given 10-cm level usually is easily assigned to a particular zone even though that level may crosscut more than one zone. For example, a level which has a moderately high fractured rock density and which appears to sample both high and low density zones can be assigned to the high density zone because it is reasonably certain that most of the rocks in that level are part of the high density scatter. However, 10-cm levels which crosscut more than one zone may contain artifacts from both zones, and thus complete separation of artifacts by component is not possible. Nevertheless, only a small number of excavation levels overlap occupational zones and it is not likely that general trends in the data are affected by the methodology.

Comparisons of selected artifact and feature distributions for each component in Units 1 and 2 are presented following discussion of each component in the text. The artifact and feature classes are selected to aid in the identification of spatially localized activity areas which were maintained for sufficiently long periods of time to produce identifiable patterning within the occupational zones.

The first map on each of the figures shows known hearths, suspected disturbed hearth areas, and squares containing: (1) fire-cracked rock weights which exceed the mean weight for the component in that unit (i.e., squares which are suggested in Chapter VI to represent dumping of exhausted hearth debris); (2) moderately high and high densities (defined as those 40 percent of the squares with the highest densities) of unmodified flakes, chips and angular fragments; and (3) undiagnostic ground and pecked stone fragments. This comparison is designed to identify possible areas of secondary deposition of lithic debitage and fire-cracked rocks.

The second map shows known and suspected hearths and squares containing: (1) fire-cracked rock weights which exceed the mean weight for the component in that unit; (2) chipped stone tools; and (3) ground stone tools. This comparison is designed to identify spatially localized activity areas.

The third map shows squares containing: (1) chipped or ground stone tools; and (2) moderately high and high densities (see above) of unmodified flakes, chips and angular fragments. This map is designed to compare possible areas of tool manufacture or discard of manufacturing debris with possible areas of tool use or discard.

The fourth map shows squares containing: (1) hammerstones; (2) unmodified cores; and (3) moderately high and high densities (see above) of unmodified flakes, chips and angular fragments. This comparison is designed to identify possible localized areas of chipped stone tool manufacture.

The fifth map shows squares containing: (1) edge-modified cores; (2) edge-modified flakes, chips and angular fragments; and (3) shaped unifaces and bifaces. This comparison is designed to identify possible spatially localized activities involving these tool classes.

The sixth map shows squares containing edge-modified flakes, chips and angular fragments with: (1) edge angles of 10° to 40°; (2) edge angles of 41° to 60°; and (3) edge angles of 61° to 90°. This comparison is designed to identify possible spatially localized activities involving tools with different edge angles.

In general, it appears either that specific activities or discard of materials were not carried out in spatially localized areas at the site or that horizontal patterning has become so complex through time due to repeated occupations that meaningful interpretations are difficult. There are, however, a few distributions which suggest patterning of artifact use or discard.

Component 1

Component 1 refers to use of the site prior to the accumulation of the dense fire-cracked rock zones in Units 1 and 2. This component is represented mostly by the deeper levels in Unit 2, designated the lower zone in Chapter VI. This lower zone contains a low density, dispersed rock scatter over most of the unit and a higher density scatter, interpreted as a disturbed in situ hearth at the southern end. A single intact hearth, Feature 27, belongs either with Component 1 or with the early stages of the succeeding component, and thus the 2160 B.C. ± 160 date for this feature provides an approximate late limit for this earliest component. The beginning date remains unknown, although based on the sparseness of cultural remains it is suspected that Component 1 was not extant for a long time. The approximate date of 2500 B.C. given by O'Laughlin (1980) for the initial occupation of Site 33 may also mark the beginnning of Component 1 at Site 32. The low density of chipped stone debitage in the Unit 2 lower zone (Table 30) suggests low intensity use of the site during this time.

Component 1 presumably is represented also by cultural materials in the lower levels of Unit 1. These lower levels (Levels 5-8) were minimally investigated and are not designated as a zone in the discussion of the distribution of dispersed fire-cracked rocks (Chapter VI). Nonetheless, that Unit 1 resembles Unit 2 structurally (i.e., in the vertical distribution of fire-cracked rocks and artifact densities) suggests that the sequences in the two parts of the site are contemporaneous.

TABLE 30

DENSITIES OF UNMODIFIED FLAKES, CHIPS AND ANGULAR FRAGMENTS BY COMPONENT

	No. of Flakes, Chips & Angular Fragments	Volume Excavated (m^3)	Density (pcs/m^3)
Unit 1:			
Component 3 (Upper zone)	3126	11.2	279.1
Component 2 (Lower zone)	5037	16.2	310.9
Component 1 (not formally identified)	*	*	*
Unit 2:			
Component 3/4 (Upper zone)	855	6.2	137.9
Component 2 (Middle zone)	1922	13.3	144.5
Component 1 (Lower zone)	783	9.7	80.7

*Data not quantified.

The comparatively low density of scattered fire-cracked rocks in contexts assignable to Component 1 (Table 31) suggests that fire-cracked rock hearths were relatively little used during this initial occupational period. This scarcity of rocks also may be reflecting low intensity use of the site or the brevity of this period of occupation.

TABLE 31

DENSITIES OF SCATTERED FIRE-CRACKED ROCKS BY COMPONENT

	Kilograms/m^2	Kilograms/m^3
Unit 1:		
Component 3 (Upper zone)	0.9	7.3
Component 2 (Lower zone)	5.8	34.3
Component 1 (not formally identified)	*	*
Unit 2:		
Components 3/4 (Upper zone)	1.1	7.5
Component 2 (Middle zone)	4.5	22.9
Component 1 (Lower zone)	0.8	4.9

*Data not quantified.

Relative percentages of artifacts associated with Component 1 in several respects differ markedly from those of later components (Tables 32 and 33). Edge-modified flakes, chips and angular fragments are the dominant tool type. Edge-modified cores are present in very low percentages. Although the sample size is small, manos appear to have been relatively important. All three manos recovered from this zone belong to Group 1. One of the miscellaneous mano fragments of unknown form was recovered in Level 5 of Unit 3 and also may relate to Component 1.

TABLE 32

NUMBER AND PERCENTAGES OF TOOLS BY COMPONENT

	Component 1		Component 2		Component 3/4		Total	
Edge-modified flakes, chips and angular fragments	15	(62.5)	105	(43.4)	54	(56.8)	174	(48.2)
Edge-modified cores	2	(8.3)	54	(22.3)	25	(26.3)	81	(22.4)
Shaped unifaces	0		3	(1.2)	0		3	(0.8)
Shaped bifaces	0		2	(0.8)	1	(1.1)	3	(0.8)
Projectile points	1	(4.2)	8	(3.3)	3	(3.2)	12	(3.3)
Manos and fragments	3	(12.5)	10	(4.1)	0		13	(3.6)
Pestles and fragments	0		4	(1.7)	0		4	(1.1)
Metate fragments	0		2	(0.8)	0		2	(0.6)
Abrader	0		0		1	(1.1)	1	(0.3)
Hammerstones	3	(12.5)	54	(22.3)	11	(11.6)	68	(18.8)
TOTALS	24		242		95		361	

TABLE 33

AMOUNT OF DEBITAGE BY COMPONENT

	Component 1		Component 2		Component 3/4		Total	
Unmodified flakes, chips and angular fragments	783	(94.5)	6959	(94.4)	3981	(96.5)	11723	(95.1)
Unmodified cores	35	(4.2)	369	(5.0)	130	(3.2)	534	(4.3)
Ground and pecked stone debitage	11	(1.3)	42	(0.6)	13	(0.3)	66	(0.5)
TOTALS	829		7370		4124		12323	

Wear patterns on the edge-modified flakes and cores differ from those of later components (Table 34), but these differences may be largely due to differences in sample size. Bifacial feather scarring on tools with small edge angles prevails suggesting that cutting of soft or medium-soft materials was an important activity.

TABLE 34

NUMBER OF APPEARANCES OF USE-WEAR SCARRING
ON EDGE-MODIFIED FLAKES AND CORES

	Component 1		Component 2		Component 3/4		Total	
10°-40°								
Unifacial, feather	0		4	(2.0)	1	(0.9)	5	(1.6)
Bifacial, feather	9	(52.9)	25	(12.5)	18	(17.1)	52	(16.1)
Unifacial, step	0		3	(1.5)	0		3	(0.9)
Bifacial, step	1	(5.9)	8	(4.0)	3	(2.9)	12	(3.7)
41°-60°								
Unifacial, feather	0		13	(6.5)	0		13	(4.0)
Bifacial, feather	3	(17.6)	41	(20.5)	21	(20.0)	65	(20.2)
Unifacial, step	1	(5.9)	8	(4.0)	1	(0.9)	10	(3.1)
Bifacial, step	0		14	(7.0)	5	(4.8)	19	(5.9)
61°-90°								
Unifacial, feather	2	(11.8)	22	(11.0)	17	(16.2)	41	(12.7)
Bifacial, feather	0		23	(11.5)	13	(12.4)	36	(11.2)
Unifacial, feather	0		24	(12.0)	21	(20.0)	45	(14.0)
Bifacial, step	1	(5.9)	15	(7.5)	5	(4.8)	21	(6.5)
TOTALS	17		200		105		322	

The single projectile point (see Fig. 52i) definitely associated with this component is one of the four Group 1 specimens. Another Group 1 point (see Fig. 52f) was recovered from Level 5 of a systematic sample unit near Unit 2 and also probably relates to this early component. The third Group 1 specimen (see Fig. 52h) was collected from the surface in an eroded area of the southern portion of the site, and its depositional context is not known. The fourth specimen (see Fig. 52g) appears to be related to the lower portions of Component 2. Overall, projectile points of Group 1 appear to be early forms at Site 32. Large, shoulderless, concave-base projectile points are not common in the El Paso area. These characteristics are found on some forms relating to the Paleoindian period (e.g., Plainview, Meserve) but the flaking patterns and triangular outlines of the Group 1 specimens are very different. Lambert and Ambler (1961:33) illustrate two "convex base blades" from Pinnacle Cave in Hidalgo County, New Mexico that resemble the Group 1 specimens. Unfortunately, the deposits in the cave were shallow and apparently mixed. Group 1 specimens also resemble some forms of the Paisano type from the Big Bend region (Suhm and Jelks 1962:227) although the shallow side-notching of Paisano is not present.

Squares with high densities of fire-cracked rock and fire-cracked rock hearths occur most frequently in the southern portions of Unit 2 (Fig. 66). Of possible significance is the presence of two of the three ground stone tools (both manos) in close proximity to the hearth areas (Fig. 66b). In general, however, little horizontal spatial patterning of artifacts and features is evident in Component 1.

Component 2

Component 2 refers to the site occupations which resulted in the accumulations of the dense zones of fire-cracked rocks in Units 1 and 2. This component is represented most clearly by the lower zone defined in Unit 1 and the middle zone defined in Unit 2. As noted earlier, these two zones are assumed to have accumulated contemporaneously. Other contexts which probably represent this component are: (1) the levels in Unit 3 with high densities of fire-cracked rocks (mostly Levels 2 and 3); (2) the levels in the sampling excavations and Phase I test pits with high fractured rock densities; (3) the surface features (Features 6, 11 and 12) which are assessed as fortuitously exposed rock scatters; and (4) much of the dispersed fractured rocks on the surface in the northern one-third of the site. Some of the surface features assessed as deflated hearths or hearth clusters also probably go with this component. These cannot be assigned to particular components on an individual basis.

Subsurface features which are assigned to Component 2, in addition to the dense zones of fire-cracked rocks, are: (1) the two intact hearths (Features 17 and 33) in Unit 1; (2) two gray-stained soil lenses (Features 30 and 34), interpreted as loci of destroyed hearths, in Unit 1; and (3) three hearths (Features 2, 5 and 32) in Unit 2. It has been suggested that the dense dispersed rock scatters in Units 1 and 2 represent loci both of disturbed but in situ hearths and of the dumping of exhausted hearth debris.

The 2160 B.C. ± 160 date for Feature 27 is interpreted as marking the approximate beginning of Component 2 although, as noted above, Feature 27 may go with the later part of Component 1. Feature 32 appears to have been used in the late stages of accumulation of the dense fire-cracked rock zone in Unit 2, and thus the 650 B.C. ± 120 date for this hearth is seen as an approximate ending date for Component 2.

Debitage densities in the lower zone in Unit 1 and the middle zone in Unit 2 (see Table 30) suggest that the intensity of site use was much greater than that for Component 1 and comparable to that for Component 3.

The high densities of scattered fire-cracked rocks in Component 2 deposits (see Table 31) indicate intensive use of fire-cracked rock hearths. Although there is no direct evidence on the function of these hearths, it is argued that the distinctly different vertical distributions of the scattered rocks and of the unmodified debitage provide indirect evidence that fire-cracked rock features were special purpose facilities, perhaps used mostly in processing leaf succulents, and that this activity was relatively important during Component 2 occupations.

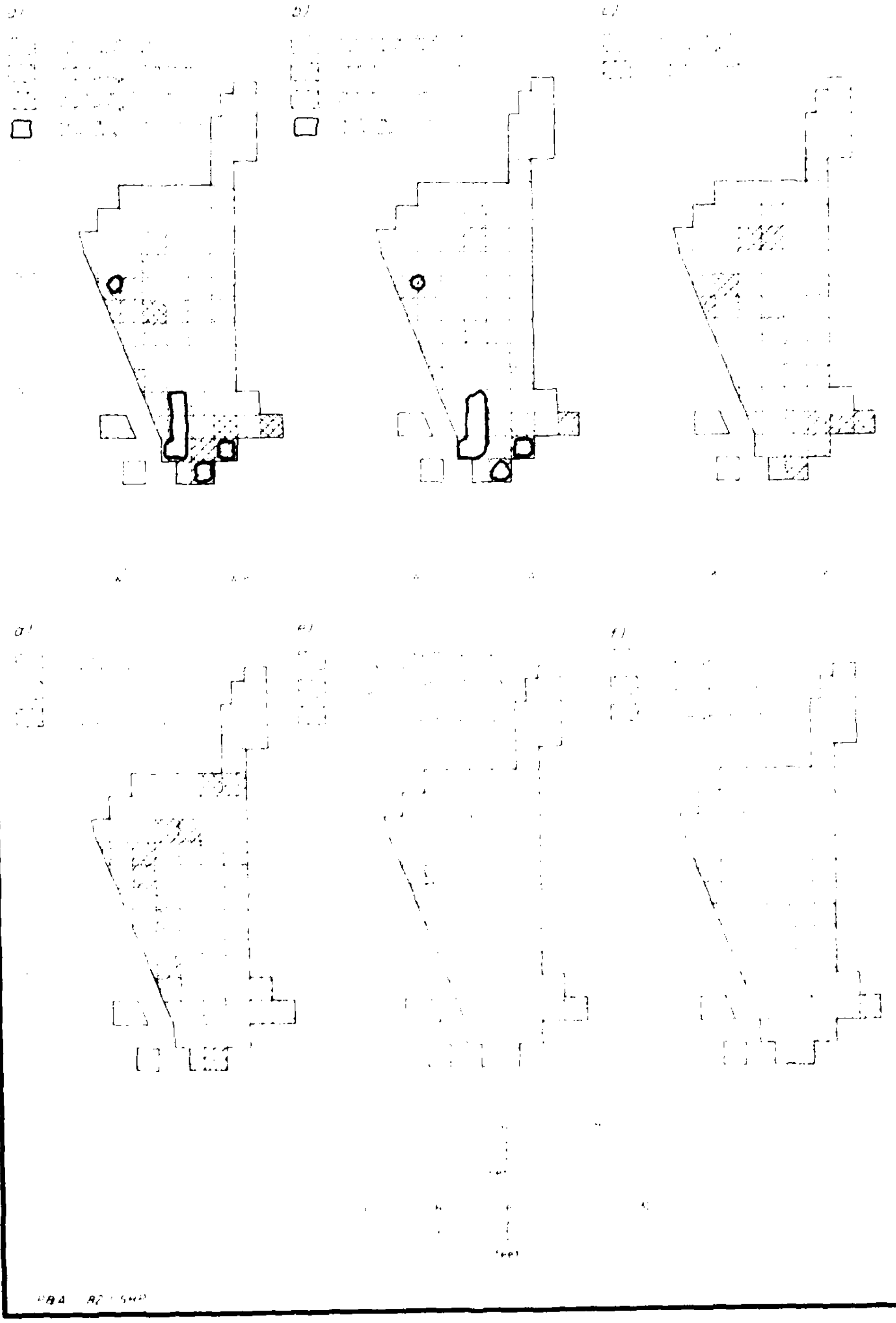
The percentage of edge-modified flakes, chips and angular fragments is significantly lower than in Component 1, and the percentage of edge-modified cores is considerably greater (Table 32). This pattern may be related to the increase in fire-cracked rocks if

Figure 66

KEYSTONE DAM PROJECT

UNIT 2, COMPONENT I

DISTRIBUTION OF SELECTED ARTIFACT & FEATURE CATEGORIES



relatively large, heavy tools are important for extractive tasks involving the processing of leaf succulents as suggested by O'Laughlin (1980:235). Tool margins with larger edge angles more often exhibit use-scarring (Table 34) suggesting that course cutting activities were of increasing importance. However, a wide variety of tool forms and wear patterns are present suggesting that occupations during Component 2 involved a range of activities and were not directed solely toward leaf-succulent processing.

Ground stone tools appear to continue to be important, with pestles and metates present in the collection in addition to manos. Four of the nine Group 1 manos relate to this component. Another was recovered from Level 3 of Unit 3 and also probably relates to Component 2. A Group 1 mano from Level 4 of a systematic sample unit may relate to either Component 1 or 2. Three of the four Group 2 manos relate to Component 2; the fourth was collected from the surface in the northern periphery of the site. Three of the miscellaneous mano fragments relate to Component 2.

Although projectile points are not present in relatively high percentages among the range of tool forms, the presence of eight specimens suggests that hunting activities may be represented in Component 2. Two of the four Group 2 (see Fig. 53a and d) specimens and all of those from Group 3 (see Fig. 53e-g) relate to this component. Similar specimens have been found in the general region (Martin and Rinaldo 1954; Beckes 1977; Whalen 1980), but the forms do not appear to be distinctive of a specific area or time period. The Group 2 points resemble the Lerma type which Suhm and Jelks (1962:207) relate to the later part of the Archaic period in southern portions of Texas. As noted previously, one of the Group 1 points (see Fig. 52g) relates to Component 2. The remaining two points have not been placed in any group. One of the specimens (see Fig. 53k) is an expanding stem form commonly found in the area (Beckes 1977; Wimberley and Rogers 1977; Skelton 1980; Whalen 1980) and assigned generally to the latter part of the Archaic period in the region (Irwin-Williams 1967:Fig. 1; Jelinek 1967:103). In outline, this point resembles the Nolan and Pandale forms of the Lower Pecos Archaic (Suhm and Jelks 1962:225, 233) but lacks the broad beveling of the stem or blade. The small obsidian biface interpreted as a point preform also appears to relate to Component 2, although its presence is somewhat anomalous since small obsidian points generally are associated with the Formative period. It is possible that the presence of this specimen in Level 3 is due to bioturbation, but no specific soil anomalies were noted during excavation.

All artifact classes, as well as fire-cracked rocks, are scattered horizontally throughout Units 1 and 2 without clear spatial patterning (Figs. 67 and 68). The northern portion of Unit 1, however, contains high frequencies of artifacts but lacks intact features. Squares containing high fire-cracked rock weights are not significantly clustered in this area relative to other parts of the unit. This pattern suggests that either: (1) this area represents secondary deposition of lithic artifacts and manufacturing debris, or (2) this is an area where intensive, varied activities were carried out over a relatively long period of time.

Component 3

Component 3 refers to occupations which postdate the accumulation of the dense fractured rock scatters in Units 1 and 2 and predate the appearance of ceramics. Component 3 is represented in its purest form by the upper zone in Unit 1 which clearly overlies the

KEYSTONE DAM PROJECT

UNIT I, COMPONENT 2

DISTRIBUTION OF SELECTED ARTIFACT & FEATURE CATEGORIES

Figure 67

dense rock zone there and completely lacks ceramics. Based on analogy with Unit 1, it is assumed that most of the cultural remains in the upper zone in the northern one-half of Unit 2 also represent Component [illegible]; however, the occurrence of ceramics and at least one subsurface Mesilla Phase hearth in Unit 2 confuse the picture somewhat. Structural similarities between the two units and the distribution of the ceramics do suggest, though, that occupations postdating Component 3 left relatively sparse cultural remains, concentrated mostly on the surface and in the upper few centimeters except at the southern end of Unit 2 where Component 3 and 4 materials appear to be inextricably mixed. (Thus the Unit 2 upper zone is labeled as Component [illegible].)

Following from this conclusion, it is suggested that most of the surface-collected materials from the site belong with Component 3. This is especially true in the south-central portion where ceramics are not found and where the sand mantle is not fully deflated. Around the site periphery, deflation has undoubtedly mixed materials representing all components. In the central part of the site, Component 3 surface artifacts are, as noted above, probably mixed with later component (Component 4) material; and in the northern one-third of the site, the lack of deposition has allowed the mixing of materials from Components 2, 3 and 4. Some of the surface features in the northern part of the site may belong with Component 3 although, as before, it is nearly impossible to state which ones.

Features which are assigned to Component 3 are: (1) the large pit (Feature 18) in Unit 1; (2) a large gray-stained soil lens (Feature 29), interpreted as a destroyed hearth locus, in Unit 1; and (3) a deflated surface hearth (Feature 1) in Unit 2. Feature 1 is included because it overlies the dense rock zone in Unit 2 and it does not have any associated ceramics. Sherds do occur in this part of the site, however, and this assignment is quite tenuous. This component is also represented by generally low density dispersed rock scatters in the three block excavation units. The scatter in Unit 1 is interpreted as representing two disturbed hearth loci and some small-scale dumping of hearth debris. The scatter in the northern part of Unit 2 is interpreted as representing small-scale dumping; that in the southern part of this unit appears to relate mostly to Component 4.

Component 3 is presumed to have an approximate beginning date of 650 B.C. and is defined as ending with the appearance of ceramics, which is dated at other sites in the El Paso area at about A.D. 1 to A.D. 300.

Debitage densities (see Table [illegible]) suggest that site use for this component was of comparable intensity to that for Component [illegible]. The comparatively low density of scattered fire-cracked rock in Component 3 deposits (see Table [illegible]) indicates that fire-cracked rock hearths were relatively little used. This conclusion is interpreted as suggesting that leaf-succulent processing was less important during this component than during Component [illegible].

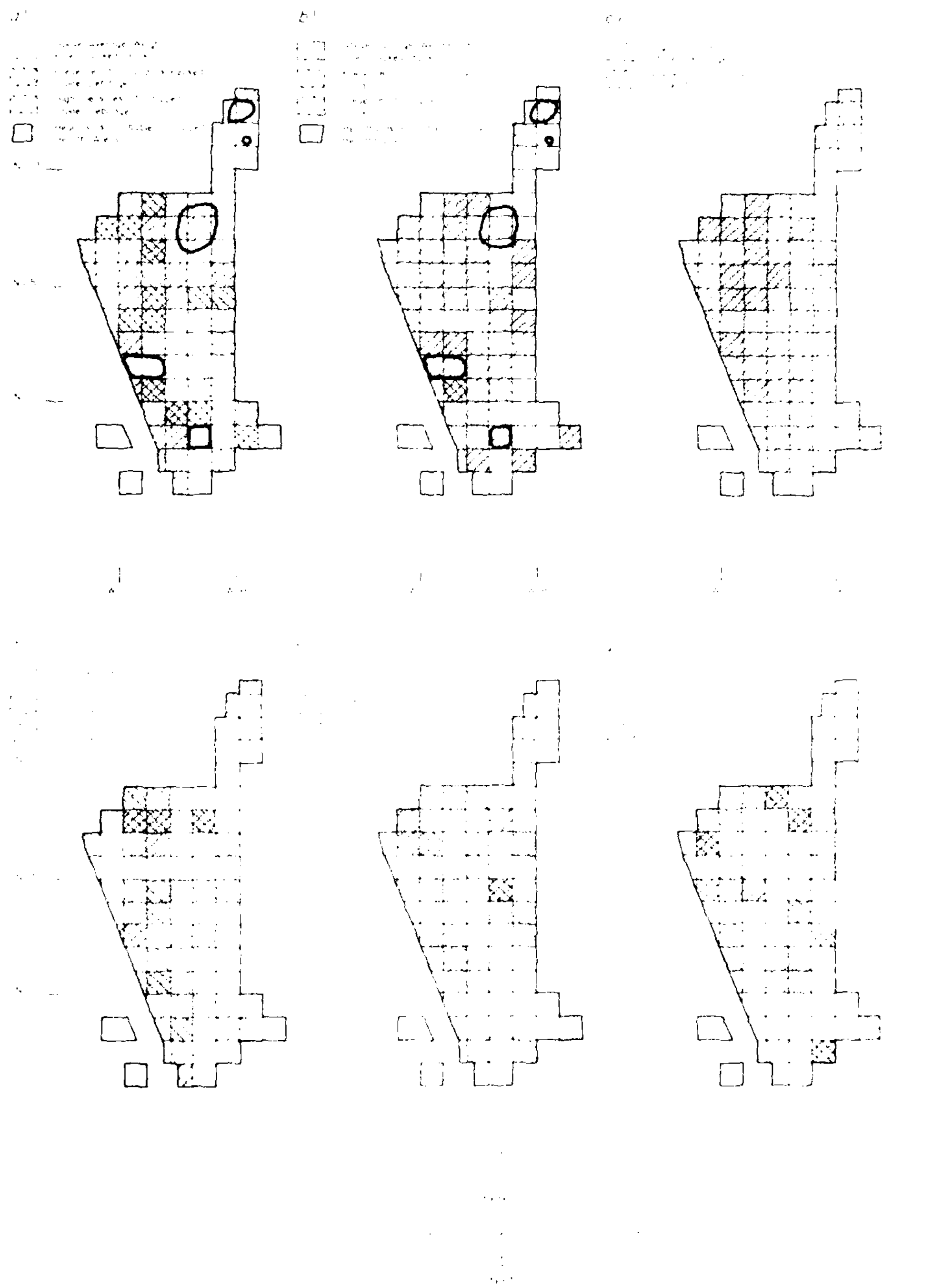
Although the fire-cracked rock densities suggest a decrease in importance of leaf-succulent processing, edge-modified cores continue as an important tool form (see Table 32). However, edge-modified flakes, chips and angular fragments are present in greater percentages than for Component 2. A significantly greater percentage of steep edges were utilized during Component 3 (see Table [illegible]4) with a variety of wear patterns. Smaller angled edges primarily exhibit bifacial feather scars. Shaped tools appear to be of very little importance, and ground stone tools are completely absent. Ground and pecked stone debitage is present but in smaller percentages than in the earlier components. There is

Figure 68

KEYSTONE DAM PROJECT

UNIT 2, COMPONENT 2

DISTRIBUTION OF SELECTED ARTIFACT & FEATURE CATEGORIES



no evidence among the chipped stone tools that leaf-succulent processing activities decreased in importance, but seed processing, manufacture/maintenance of seed-processing tools, and perhaps hunting may represent activities of lesser importance relative to earlier occupations.

Projectile points from Component 3 consist of one Group 2 specimen (see Fig. 53b), one specimen from Group 4 (see Fig. 53h), and one ungrouped specimen (see Fig. 53j). Forms resembling those of Group 4 are not widely illustrated in published reports of the area. Five apparently similar specimens (Beckes 1977:Fig. II-14) were found during a surface survey of McGregor Range. Other similar forms have been reported from Cordova Cave (Martin and Rinaldo 1954:126) and from the Hueco Bolson (Whalen 1980:Fig. 13). Temporal or cultural affinities, however, are not clear. The small, stemmed ungrouped point also is not diagnostic of a particular time period, but similar forms are present in collections from surveys in the area (e.g., Beckes 1977:Fig. [illegible]; Skelton 1980:Fig. [illegible]).

In Unit 2, Component 3/4 is represented mostly in the southern portions and this is reflected clearly by the artifact and fire-cracked rock distributions (Fig. 70). In Unit 1 a slight variation in the distributions of debitage and tools is evident (Fig. 69c). Squares containing high debitage densities are more clustered in the central part of the unit, while tools, although widely scattered, tend to be present in a greater number of units to the north. Although the sample size is smaller, hammerstones and unmodified cores tend to be distributed in a manner similar to the unmodified flakes, chips and angular fragments. These distributions suggest either that areas of tool manufacture and tool use were spatially distinct during some occupations; or that activities carried out at Site 32 differed during separate occupational episodes within the third occupational period. In the latter case, it is assumed that the separate occupational episodes centered on slightly different areas within Unit 1.

Component 4

Component 4 refers to Formative period occupations of Site 32. Although some of the cultural remains assigned to Component 3 could represent aceramic Formative period occupations, the most confident marker of the Mesilla Phase is the occurrence of plain brownware sherds, and it is this criterion which distinguishes Component 4.

As noted, the distribution of ceramics at Site 32 suggests that Component 4 occupations were short lived and few in number and that they left sparse cultural remains. Isolating these remains is, thus, quite a problem (Component 4 materials are not isolated in Tables 30 through 34). Materials which can be assigned most reasonably to Component 4 come from the surface of that portion of the site (covering 1100 m²) where most of the ceramics were found. Quite clearly, however, these surface-collected artifacts are mixed with those from earlier occupations, especially those representing Component 3, and cannot be considered a discrete analytical unit.

The A.D. 520 ± 70 date for Feature 21 indicates that part of the upper zone defined in Unit 2 also belongs with Component 4; however, this portion of the Unit 2 deposits probably contains substantial amounts of materials representing Component 3, and there is no way of separating the two. Based on its vertical position, Feature [illegible] is assessed as belonging with Component 4. Some of the deflated surface hearths may also represent

KEYSTONE DAM PROJECT

UNIT I, COMPONENT 3

DISTRIBUTION OF SELECTED ARTIFACT & FEATURE CATEGORIES

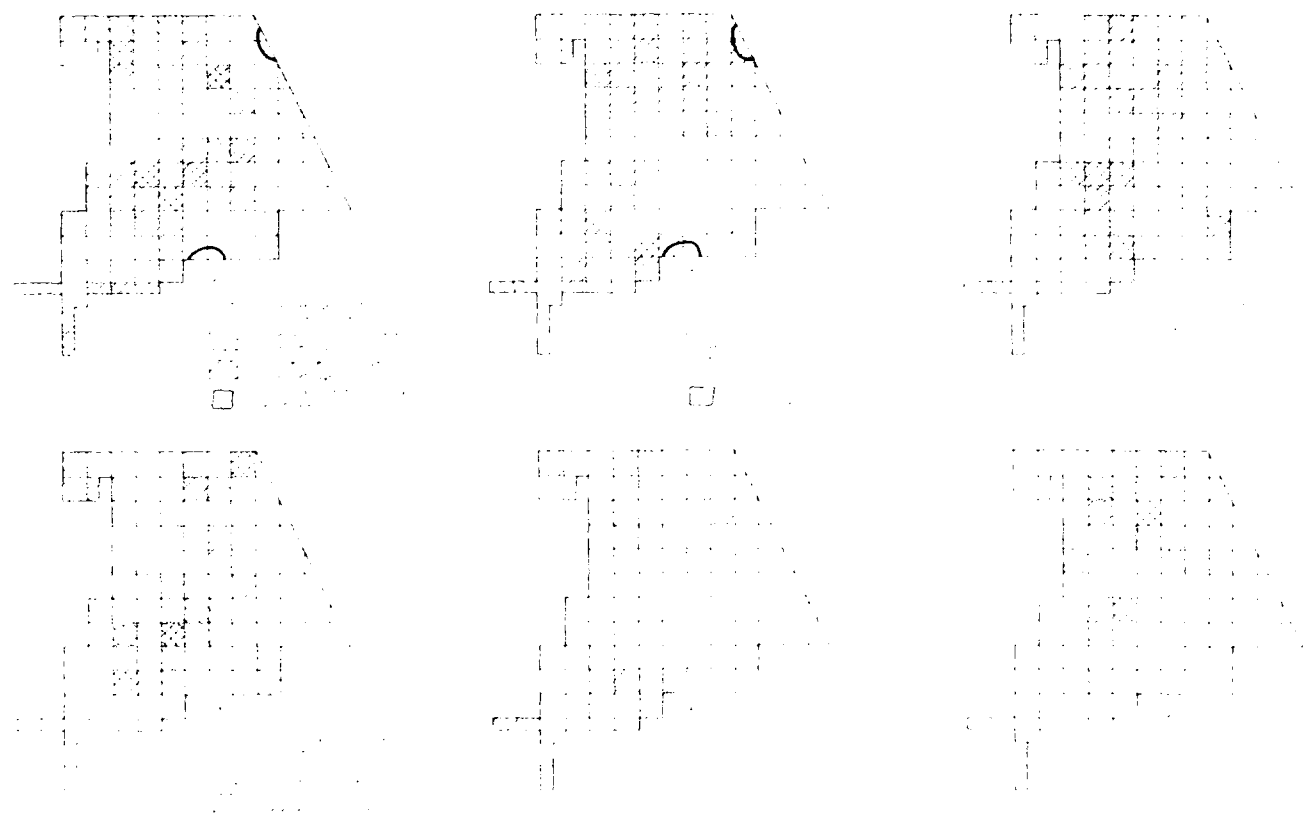


Figure 69

Component 4 occupations. This seems most likely with Feature 9 since almost one-half of the ceramics recovered from the site were on the surface near this feature; but it is also possible that Features 1, 8, 13, 14 and 15 belong with Component 4 since they occur in the part of the site containing ceramics.

Component 4 is given a beginning date of sometime between A.D. 1 and A.D. 300 based on radiocarbon dates from nearby sites. Of course, there is no way of knowing if Mesilla Phase occupations actually date this early at Site 32. The radiocarbon date from Feature 21 and the presence of cultural remains above this feature indicate that Component 4 occupation lasted until sometime after about A.D. 520. It is suspected that Component 4 ended by around A.D. 700. The sparseness of the cultural remains apparently relating to Component 4 suggests low intensity use of the site.

It is apparent that fire-cracked rock hearths were used in Component 4 occupations, and thus some leaf succulent processing may have been taking place; but the lack of comparable data for this component and others precludes confident statements as to the relative importance of this activity. The lack of very large rock hearths for Component 4 and the restricted horizontal distribution of Component 4 materials does suggest, however, that the site was not being used for large scale processing of leaf succulents. Based on this conclusion, it is presumed that the site was used as a multipurpose campsite rather than a special purpose plant processing locale.

Discussion

This analysis has defined four occupational periods for Site 32 and has attempted to compare and contrast the ranges of activities carried out at the site between these components. Component 4, representing the Mesilla Phase occupation, is the most difficult to characterize because materials are sparse and not easily isolated. Thus, conclusions about site function for Component 4 are conjectural. It is also relatively difficult to characterize Component 1 occupations with confidence because they are represented by a small sample of data and it is suspected that some of the materials assigned to this component have been translocated downward from Component 2 deposits. For these reasons, the following discussion addresses site function for all four components but concentrates on Components 2 and 3.

In Chapter II, hypotheses and test implications were presented through the use of which it was hoped to relate the various occupations of Site 32 to regional settlement strategies. Site 32 was hypothesized to represent either: (1) a residential base within a forager system; (2) a residential base within a collector system; or (3) a field camp within a collector system.

Components 1 and 2, representing the middle to late Archaic, include a variety of chipped stone and ground stone tools, as well as ground stone debitage and hammerstones, suggesting that a variety of plant and animal foods were being processed and that maintenance activities were being performed. No structures are associated with either component. Increased fire-cracked rock densities in Component 2 suggest that leaf-succulent processing may have been a very important activity at this time. However, the number and variety of tool forms also increase which appears to contradict the hypothesis that occupations began to focus solely on the processing of upland leaf succulents. Horizontal

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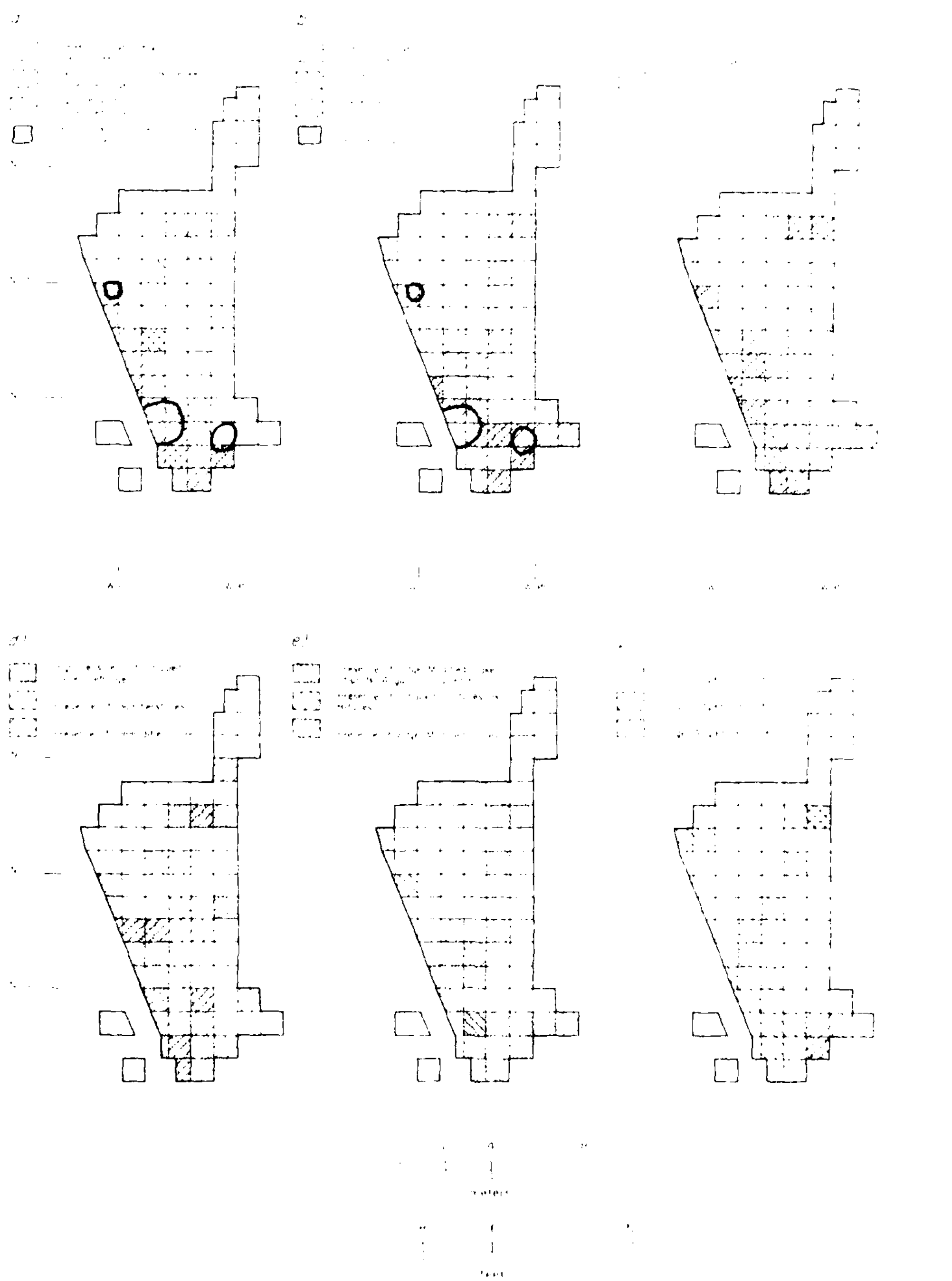
Figure 70

UNIT 2, COMPONENT 3/4

DISTRIBUTION OF SELECTED ARTIFACT & FEATURE CATEGORIES



patterning of features and artifacts is highly complex and repeated and relatively short-term occupations appear to be represented.

During Component 3 the range of activities carried out at Site 32 appears to have narrowed. Fire-cracked rock hearths were less commonly used, and thus leaf-succulent processing may have decreased in importance. Ground stone tools and materials indicating manufacture or maintenance of these tools decrease in frequency, and thus seed processing also may have decreased in importance. Continued high densities of chipped stone tools and debitage suggest that some processing and maintenance activities were still being carried out, however. Similar to the earlier components, structures and identifiable artifact and feature patterning are absent. Component 3 appears more strongly to represent a field camp although the nature of activities carried out is not known. Perhaps during this time the site was occupied as a field camp exclusively and processing activities were carried out elsewhere.

Because it is difficult to relate features and lithic artifacts to Component 4, its role in regional settlement strategies is difficult to assess. We can be reasonably certain that the site was not occupied by a large social group or for a long period of time. The lack of large hearths suggests that intensive plant-food processing was not an important activity at Site 32 during the Mesilla Phase.

There is a strong indication that the range of activities carried out at Site 32 changed during the terminal Archaic and thus that the function of the site occupations within their respective settlement systems also may have changed. Whether or not these changes reflect major shifts in subsistence and other resource procurement strategies cannot be adequately assessed with currently available data, but a couple of suggestions can be made which may help guide future studies.

First, if the subsistence base changed very little during the terminal Archaic, activities involving the use of ground stone implements (e.g., seed processing) and rock hearths (e.g., processing of upland leaf succulents) apparently were carried out elsewhere. A logical area for the latter activity is in the upper bajada and mountain zones where leaf succulents are most abundant. Such sites have been documented for the Archaic period (O'Laughlin 1979). In this case Component 3 at Site 32 might represent a field camp occupied for the purpose of procurement of resources restricted to the lower bajada or riverine zones.

A second (or additional) possibility is that primary food resources such as leaf succulents were replaced in importance during the terminal Archaic by other resources such as cultigens. Residential bases may then have been more often located on the Rio Grande floodplain or western valley margins where horticulture could have been practiced more easily, a pattern suggested by O'Laughlin (1980:29) for the Formative period. The location of Site 32 in proximity to both riverine and upper bajada resources may have made it a useful field camp for a variety of purposes, including limited leaf-succulent processing.

Both of these alternatives have testable implications. It is felt that the efforts reported here can serve, along with the testing efforts at the other Keystone Dam sites, as important first steps in refining existing models and perhaps building new ones to explain cultural dynamics in the southern Mesilla Bolson. While survey-level data are

invaluable for helping to construct such models, the investigations reported here demonstrate that further intensive excavations will be required to understand the complexity of the archeological record and ultimately to provide an accurate picture of area cultural systems.

CHAPTER XII

SUMMARY

This report has described investigations carried out at EPCM:31:106:2:32 (Site 32), an Archaic and early Formative period site in El Paso, Texas, by Prewitt and Associates, Inc. for the U.S. Army Corps of Engineers, Albuquerque District. Site 32 is one of three National Register eligible sites that will be affected by construction of the El Paso Flood Control Project, Northwest Area. The site will be destroyed during this construction, and the investigations reported here constitute a mitigation of these adverse impacts.

The site was first recorded in 1976 (Gerald 1976) as having two fire-cracked rock hearths and a moderate density of chipped stone tools and debitage visible on the surface. The site was revisited in a second phase of cultural resources investigations in connection with construction of the Keystone Dam and was reassessed as having higher artifact densities and a greater number of hearths on the surface than was initially recorded (O'Laughlin 1980). It was observed at that time that the primary occupation appeared to date to the late Archaic period but that a later early Formative period component was also present.

In the summer of 1981, the Corps of Engineers issued a request for proposals for mitigation efforts at Site 32. The Scope of Work called for a 36-week program composed of three phases -- an 8-week planning and review phase, a 7-week fieldwork phase, and a 21-week analysis and report preparation phase. The contract was awarded in late February 1982; the third phase was completed on November 12, 1982.

The site is located on a Pleistocene alluvial terrace about 3 km northeast of the Rio Grande and 6 km west of the Franklin Mountains. These terrace deposits served as an easily exploited lithic material source for the site's inhabitants. Cultural remains occur over the entire 12,600-m² terrace surface but are most concentrated in the roughly 6000-m² central portion. This central area is blanketed with a mantle of eolian sands which are up to 80 cm thick and which contain buried cultural materials. Depositional episodes within these eolian sediments could not be defined, and thus cultural remains could seldom be correlated stratigraphically. The site soils have further complicated interpretation because they are not conducive to the preservation of organic remains and contextual information.

In terms of present-day climate, the El Paso area can be characterized as semiarid and mesothermal. Although the evidence is far from conclusive, it has been suggested that the mid to late Holocene had an essentially modern climate but with a trend toward increasing aridity during the mid-Holocene. Prehistorically, the area was probably a desert grassland with a gradual increase in xerophytic upland species and desert shrubs through time.

It also has been suggested that the subsistence system of preagricultural peoples in the project area entailed a heavy reliance on leaf succulents, mesquite pods, tornillo pods, wolfberries and cattails with minor contributions by grass seeds, acorns, whitethorn beans, greens and seeds of herbaceous plants, deer, rabbits, fish and waterfowl. These resources probably would have been most abundant at higher elevations east of the site, on

the Rio Grande floodplain west of the site, and on the La Mesa Surface and adjacent slopes west of the floodplain; but Site 32 is within 6 km of all of the resource zones defined for the area, and it is likely that all of the zones could have been utilized on a daily foraging basis. While most of the resources would have been most abundant or in their prime condition for utilization during the spring, summer and fall, many would also have been available during the winter; and it is suggested that there is insufficient evidence to infer that the Site 32 occupations were tied to particular seasons of the year.

The cultural history of the project area has been described using the three-period -- Paleoindian, Archaic and Formative -- framework commonly employed by other researchers in the area. Although these periods are not intended to represent a strict developmental sequence, they can be used to characterize changes in adaptive strategies in the region. Adaptations during the Archaic period, which is the most pertinent to this study, probably involved a broad-spectrum gathering and hunting subsistence base, high residential mobility, low population density, and small social group size. The Formative period apparently saw a shift, at first gradual and then radical, away from this adaptation toward an increased reliance on cultigens, greater sedentism, an increase in settlement system specialization, and an increase in social integration.

Previous investigations [illegible] and 1930s. [illegible] intensively [illegible] investigation [illegible] work has been done [illegible] [illegible].

flotation and pollen -- which could be used in addressing questions of chronology, feature function, and paleoclimate. With the exception of three radiocarbon samples which yielded dates, these special sampling efforts were unproductive because of poor preservation. After assessing the results of these investigations, it was concluded that most of the chosen strategies and techniques accomplished what they were intended to insofar as the remains would allow.

Evidence of cultural features at Site 32 includes eleven surface concentrations of fire-cracked rocks, a variable density surface fire-cracked rock scatter over at least the central part of the site, eight relatively intact subsurface rock hearths, a variable density dispersed rock scatter in each block excavation area, three gray-stained soil lenses, and one large pit. One of the surface features is an intact rock hearth; seven are interpreted as deflated individual hearths or hearth clusters; and three appear to be fortuitously exposed dispersed rock scatters. The rock scatter which extends over much of the site surface is interpreted as representing the debris from hearths; however, the peculiar distribution is largely the result of geomorphic rather than cultural processes.

The subsurface dispersed rock scatters are very informative in that their vertical distributions can be used to separate the cultural remains into three temporal periods. These suggested periods -- pre-2160 B.C., 2160-650 B.C., and post-650 B.C. -- are used in Chapter XI to study changes in site function through time. The dispersed scatters are further analyzed through a study of their horizontal distributions, and it is suggested that areas containing heavily disturbed but in situ hearths and dumped, exhausted hearth debris are identifiable. The eight subsurface hearths show considerable variation in size, amount of rocks, and degree of rock breakage which suggests differences in the use histories of these features. They do not, however, provide any direct evidence on the question of whether rock hearths were special-purpose facilities for leaf-succulent processing or were general-purpose facilities. The gray-stained soil lenses are interpreted as loci of destroyed rock hearths or the remains of hearths lacking rocks. The final feature, the single pit, is of unknown function, but there is ephemeral evidence suggesting it was used in pit-baking.

The collection of chipped stone artifacts from Site 32 consists of 16,780 unmodified flakes, chips and angular fragments; 419 edge-modified flakes, chips and angular fragments; 1133 unmodified cores; 178 edge-modified cores; and 46 shaped unifaces and bifaces. Over half of the artifacts are made of chert. Rhyolite, fine-grained quartzite, sandstone, basalt, limestone and obsidian constitute the remaining raw materials types identified in the collection. All of these materials are available in the local alluvial and colluvial gravels on or immediately adjacent to the site.

Reduction sequences at Site 32 appear to have been relatively simple and directed toward the production of flake and core tools which lack substantial outline modification. Edge-modified flakes are the most common tool form. The data indicate that single platform and bifacial cores were utilized more frequently as tools than were multiple platform cores. Shaped tools consist of six unifaces, nineteen projectile points, five other bifaces, and sixteen biface fragments. The lack of specimens identifiable as blanks or preforms, and the paucity of biface thinning flakes suggests that these tools rarely were manufactured at the site.

Functional analyses of the tools suggest that a variety of cutting, scraping, chopping and shredding activities were carried out at Site 32. Core tools appear to have been

most important in medium to coarse cutting, chopping and shredding activities. Edge-modified flakes, chips and angular fragments probably were used in a wider range of activities.

The collection of ground, pecked and battered stone from Site 32 consists of 26 manos or mano fragments, 6 pestles or pestle fragments, 8 metate fragments, 2 sandstone abraders, 60 unidentifiable fragments with grinding and pecking, 25 unidentifiable fragments with pecking only, 1?? hammerstones, 1 anvil stone, 1 battered cobble resembling a crude pestle, and 312 flakes, chips and angular fragments apparently resulting from the manufacture or maintenance of ground, pecked and battered stone tools. Nine raw material types are identified: coarse-grained quartzite (480 specimens), gabbro (22 specimens), rhyolite (17 specimens), limestone (10 specimens), micaceous schist (9 specimens), diorite (8 specimens), basalt (6 specimens), sandstone (5 specimens) and syenite (1 specimen). The distribution of these artifacts suggests that hammerstones were used in the manufacture of ground stone tools. Further, it appears that seed processing (as reflected by these tools) and manufacture of seed-processing tools were relatively important activities during mid to late Archaic period occupations in comparison to the very late Archaic and Mesilla Phase occupations.

Only 90 ceramic sherds were found during these investigations. One of these is a rim fragment; the rest are body sherds. All but four are tempered with coarse sand and are assigned to the type El Paso Brown. The remaining four have finer grained temper and are labeled tentatively as Alma Plain. Most of the ceramics were found on the site surface, and most of those recovered during the excavations were in the uppermost level. Horizontally, ceramics occurred almost exclusively in a 1200-m² area in the north-central part of the site. The nature and distribution of this artifact class suggest that the Formative period occupation of the site was restricted to the Mesilla Phase and that the Mesilla Phase occupations were few in number and of short duration.

Chapter X summarizes the results of the radiocarbon, macrobotanical, palynological and faunal analyses. Only three of the radiocarbon samples collected yielded dates -- 216? B.C. ± 160, 650 B.C. ± 110, and A.D. 520 ± 70. These dates and their contexts show that Site 32 was occupied during the Archaic and early Formative periods. The dates are also used as rough chronological limits for the occupational periods defined at the site. The only macrobotanical remains found were those recovered from flotation samples. This sampling program was designed to help provide functional interpretations for the features, and thus samples were taken from a number of features as well as nonfeature contexts (for control samples). A pilot study of 11 of the samples yielded only modern plant parts and some unidentifiable charcoal and provided the basis for determining that botanical remains were too poorly preserved to warrant analysis of additional samples. Similar negative results were obtained from a pilot study of 11 pollen samples collected from both feature and nonfeature contexts. This sampling program was intended to provide information on feature function and paleoclimate, and thus samples were taken from features and both on-site and off-site stratigraphic columns. Because of the poor pollen preservation and abundant modern pollen contamination in the pilot study samples, additional samples were not analyzed. Most of the small collection of faunal remains recovered from the site were unburned and of obviously recent origin. The only culturally significant remains were two fish bones, one jackrabbit bone, and a small number of fragments representing small and large mammals. These remains are interpreted as indicating some utilization of animal resources from the Rio Grande and the bajada slopes adjacent to the floodplain. The scarcity of faunal remains is due in part to poor preservation but also suggests that hunting did not play a major role in subsistence.

In Chapter XI the results of the analyses are synthesized in order to define and characterize four major occupational periods (called components) of the site. Inferences are made concerning the roles these components play in their respective subsistence and settlement systems. The initial component relates to the Archaic period and probably lasted until about 2160 B.C. The beginning date is not known. The component is represented by deposits underlying the dense scatter of fire-cracked rocks, and thus fire-cracked rock hearths appear to have been little used during these occupations. A relatively diverse range of artifacts associated with this period suggests that the site was used as a multipurpose campsite where a variety of extractive and maintenance tasks were carried out.

The succeeding component (Component 2) is represented by the dense scatter of fire-cracked rocks and appears to have lasted from about 2160 B.C. until 650 B.C. The site appears to have been occupied more intensively during this time as evidenced by greater numbers of artifacts and features. As with the first component, the site appears to have been used for a wide variety of extractive and maintenance tasks. However, the high densities of fire-cracked rocks suggest that the processing of leaf succulents was more important during this time.

Component 3 is represented by deposits overlying the dense fire-cracked rock scatter and probably dates from about 650 B.C. up to the appearance of ceramics in the El Paso area (A.D. 1 - A.D. 300). Artifacts are similar to the earlier components except that projectile points, ground and pecked stone tools, and hammerstones are not as numerous. These data, together with the the lower densities of fire-cracked rocks, suggest that leaf-succulent processing, seed processing, and perhaps hunting all decreased in importance at this time.

Component 4 is represented by the presence of brownware sherds and relates to the Formative period in the El Paso area. Other materials relating to this component cannot be isolated from those of Component 3. The distribution of the ceramics suggests that Component 4 occupations were short-lived and few in number. These occupations probably date from somewhere between A.D. 1 and A.D. 300 until sometime after A.D. 520. Although some fire-cracked rock hearths may be associated with this component, the lack of very large hearths suggests that the site was not used primarily for large-scale processing of leaf succulents, but rather was a multipurpose campsite.

It is suggested that, while Site 33 was used as a multipurpose campsite throughout its occupational history, its role in subsistence and settlement systems shifted somewhat through time. Certain subsistence activities which were important at the site during the mid to late Archaic seem to have decreased in importance during the very late Archaic. It is proposed that these changes may have involved: (1) a decreased reliance on leaf succulents and increased reliance on cultigens with the focus of occupation in the southern Mesilla Bolson shifting to sites west of the Rio Grande; or (2) an increase in the intensity of leaf-succulent processing with increased use of special processing sites near the Franklin Mountains. In either case, an increase in site specialization is indicated.

The investigations reported here make several significant contributions. The body of data presented is the largest currently available on the Archaic period in the El Paso area and provides a wealth of comparative information. The evidence on activities carried out at the site allows inferences as to how the site functioned within settlement and subsistence systems which, in turn, provides directions for further research in Archaic

adaptations in the area. Indeed, this research is seen as an important initial step towards understanding some of these systems and as providing the basis for testable models concerning adaptations in the area. Just as importantly, however, these investigations demonstrate that open sites like Site 32, with homogeneous deposits and poor preservation, can be made to yield substantive data when approached in a thoughtful way.

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APPENDIX A: Geologic Investigations

Vance T. Holliday

INTRODUCTION

Geologic consultation was provided Prewitt and Associates, Inc. for two field days in May and June 1982 as part of archeological investigations at EPCM:31:106:[illegible] (Site [illegible]), El Paso County, Texas. The geologic investigations were aimed at reconstructing the geomorphic history of the immediate site area and interpreting the stratigraphic and sedimentologic record of the site.

The geologic investigations were carried out by means of field examination of the site and surrounding area. Excavation units and a series of backhoe trenches provided excellent exposures of the site deposits. Several profiles were described using standard nomenclature (Soil Survey Staff 1975; Guthrie and Witty 1982) (Table 35). Geologic research was aided by available topographic and geologic maps, soil surveys and airphotos. Literature pertinent to the geology of the area was reviewed.

Some soil samples were taken and subjected to several analyses (Table 36). The samples were sieved to estimate sand versus silt plus clay content and to determine sand fractions. These data aided in detecting lithologic discontinuities (as indicators of depositional breaks). The calcium carbonate percent was also determined for the samples in order to estimate the degree of soil profile development (i.e., calcium carbonate accumulation was considered a function of age).

In the following report, a general review of the geologic setting is presented first. This is followed by a discussion of the local geomorphic setting and evolution of the site. The stratigraphy of the site is then discussed followed by concluding remarks.

REGIONAL GEOLOGIC SETTING

Considerable information is available on all aspects of the geology of southern New Mexico and far west Texas in the El Paso region (e.g., Fitzsimmons and Lochman-Balk 1965; Cordoba et al. 1969; Seager et al. 1975; Hawley 1978). The following discussion is based on these sources as well as Kottlowski (1958), O'Laughlin (198[illegible]) and Hunt (1967).

The El Paso region is within the Mexican Highlands section of the Basin and Range physiographic province. The area is composed of well-defined, north-south-trending fault block mountain ranges separated by wide valleys. Most of the intermontane valleys drain into the Rio Grande. A few of the valleys are, however, closed basins or bolsons and contain playas (see Fig. 4).

The El Paso area also marks the approximate southern boundary of a striking structural feature known variously as the Rio Grande depression, the Rio Grande graben, or Rio Grande rift. This rift, representing a "pull-apart" zone within western North America, begins near Leadville, Colorado and ends in the El Paso region, the structural features here merging with the more typical basin and range structures to the south and west. The entire Rio Grande Valley from El Paso northward lies within this wide, deep fracture in the earth's crust.

TABLE 35

STANDARD NOMENCLATURE DESCRIPTIONS OF SELECTED PROFILES

Horizon	Depth (cm)	Munsell Color (dry)	Texture	Structure	Consis- tence	Rxn	Boundary
Backhoe Trench A, 3 m from the north end							
A	0-9	10YR 6/2	S	1msab	sh	ev	gs
B1	9-20	10YR 6/3	S	1fsab	sh	ev	gs
B2K	20-40	10YR 7/2.5	LS	1fsab	lo	ev+	aw
2C1	40-58	10YR 6.5/2	GS	sg	lo	ev	aw
3C2	58+	-	G	-	-	-	-
Backhoe Trench G, 5 m from the east end							
A	0-6	10YR 5/2	S	1msab	sh	ev	gs
B1	6-25	10YR 6/2	S	1fsab	sh	ev	gs
B2K	25-50	10YR 5/2	LS	1fsab	lo	ev+	aw
2C1	50-65	10YR 6/2	GS	sg	lo	ev	aw
3C2	65-84	-	G	-	-	-	-

ABBREVIATIONS:

Texture: S = sand; LS = loamy sand; GS = gravelly sand; G = gravel

Structure: Grade - 1 = weak; size - f = fine, m = medium; type - sg = single grain, sab = subangular blocky

Consistence (dry): sh = slightly hard; lo = loose

Rxn (reaction with HCl): ev = violently effervescent

Boundary: g = gradual; a = abrupt; s = smooth; w = wavy

TABLE 36

LABORATORY DATA ON SOIL SAMPLES FROM BACKHOE TRENCH A PROFILE*

	Particle Size Distribution (mm)**						Silt & Clay	
			Sand					
Horizon	2	2-1	1-.5	.5-.25	.25-.125	.125-.05	.05	$CaCO_3$%***
A	-	3	20	30	39	6	2	3.1
B1	-	2	15	28	45	7	3	5.9
B2K	-	2	14	24	49	9	2	5.0
2C1	8	4	21	22	35	8	2	4.9

*These samples were taken from the same Backhoe Trench A profile described in Table 35.

**Processed by dry sieving. Carbonates not removed and no dispersant added; therefore, numbers should only be used for approximation of texture and for detecting significant textural changes.

***$CaCO_3$ by Chittick method (Bachman and Machette 1977; Dreimanis 1962).

The mountain ranges of the El Paso region, composed of Precambrian, Paleozoic, Mesozoic and Cenozoic rocks, were faulted and uplifted beginning in the early or middle Tertiary. The direction of tilting and faulting of the mountain ranges is variable. Some blocks tilt east and are down-faulted on the west, and others are tilted west and down-faulted on the east.

As the mountain ranges were faulted and uplifted, they were also eroded with the detritus being deposited in the grabens or structural basins between the ranges. As the mountains continued to rise, the basins continued to fill. The result is basin-fill as much as several thousand meters thick in some areas. Today the mountains can be likened to islands surrounded by their own debris. The ranges make up about one-fourth to one-third of the area; the valleys occupy the rest (see Fig. 4).

The project area is located at the southern end of one of the intermontane basins known as the Mesilla Bolson. This basin extends from northwestern El Paso to about the Las Cruces, New Mexico area. The Mesilla Bolson is bordered by the Sierra de las Uvas and Potrillo mountains on the west and the Organ and Franklin mountains on the east. The mountains nearest the project area are the Franklins (Figs. 4 and 71).

The mountains surrounding the Mesilla Bolson drain into the basin. From late Tertiary until mid-Pleistocene times, the Mesilla Bolson was a closed basin and ac[illegible] over 1000 m of fill derived from (1) the four mountain ranges; (2) the upper [illegible]

[illegible], which, until the mid-Pleistocene, terminated in the area by emptying into a [illegible] known as Lake Cabeza de Vaca; and (3) lacustrine sedimentation from Lake Cabeza [illegible]. These various basin-fill sediments are known as the upper Santa Fe Group.

[illegible] entrenchment of the Rio Grande in the mid-Pleistocene, the floor of the [illegible] was the floor of the northeastern end of Lake Cabeza de Vaca. The margins [illegible] basin were formed by fans and coalesced fans from the adjacent mountain ranges.

In the mid-Pleistocene, the Rio Grande below El Paso developed a through-drainage [illegible] the upper or ancestral Rio Grande. The point where the two drainages merged was [illegible] southeast of El Paso. This event drained Lake Cabeza de Vaca, and the [illegible] Rio Grande has subsequently entrenched 90 m below the floor of the Mesilla [illegible]. The valley below the basin floor is referred to as the Mesilla Valley. The [illegible] entrenchment has left the ancient floor of the Mesilla Bolson as an extremely level, uninterrupted surface known as La Mesa or the La Mesa Surface. The La Mesa Escarpment is [illegible] prominent west of the Rio Grande in the project area (see Fig. 71).

Entrenchment of the Rio Grande below the ancient basin floor has been marked by [illegible] episodes of valley cutting, each followed by intervals of partial back-[illegible] attainment of equilibrium by the Rio Grande. Evidence of these events is [illegible] along the river in the form of a stepped sequence of surfaces of both deposi-[illegible] and erosional origin, each graded to successively lower stands of the Rio Grande [illegible].

[illegible] late Quaternary surfaces and deposits, postdating river valley entrench-[illegible], have been identified along the Rio Grande. Along the upper Mesilla Valley in the [illegible] area, the surfaces and deposits, from oldest to youngest, are termed the [illegible] (150-250 ky B.P.), Picacho (25-75 ky B.P.) and Fort Selden (the latter sometimes [illegible] into the Leasburg (8-15 ky B.P.) and Fillmore ([illegible] yr B.P.)). In the El [illegible] area, the correlative surfaces and deposits are the Kern Place, Gold Hill and "lower [illegible] sequence" (Fig. 72; Table 3[illegible]).

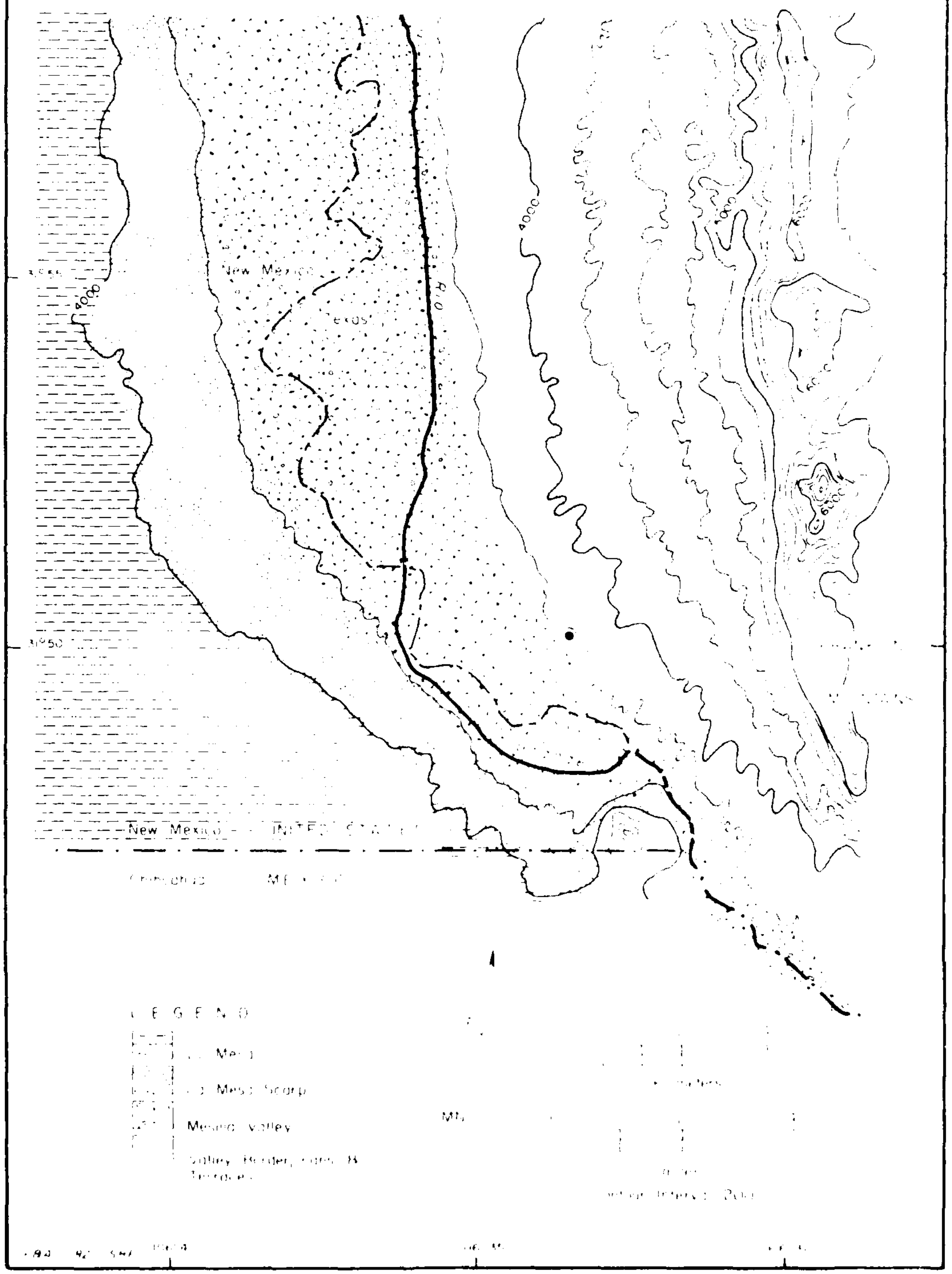
TABLE [illegible]

CORRELATION OF DEPOSITS AND SURFACES IN THE
LAS CRUCES AND EL PASO AREAS

	Las Cruces (Gile et al. 1981)		El Paso (Kottlowski 1956; Metcalf 1969)
[illegible]	Fillmore / Leasburg	Fort Selden	lower terrace sequence
[illegible]	Picacho		Gold Hill
	Tortugas		Kern Place
	La Mesa		La Mesa

Figure 71

KEYSTONE DAM PROJECT
AREA PHYSIOGRAPHIC MAP



LOCAL GEOMORPHIC SETTING

Considerable soil-geomorphic investigations have been carried out along the Rio Grande in the Las Cruces area since the late 1950s (e.g., Gile 1979; Gile et al. 1981). Similar, although limited, work has been conducted in the El Paso region, and it is considered that geomorphic processes and events in both areas are similar and correlatable (Kottlowski 1958; Metcalf 1969; Gile et al. 1981). Therefore, geomorphic and stratigraphic terminology from both areas (following Kottlowski 1958; Metcalf 1969; Gile et al. 1981:1-25, 44-46) are utilized in the following discussion (Figs. 73 and 74).

Site 32 is located on the summit platform of a dissected alluvial terrace of the Rio Grande. The surface of the terrace is about 18 m above the immediately adjacent Rio Grande floodplain. Elevation and geomorphology suggest that the site is on the Picacho-Gold Hill alluvium.

The dam site area has been heavily dissected by a series of northeast-southwest-trending arroyos cutting into the Picacho-Gold Hill and older surfaces and deposits. These arroyos, undoubtedly of Holocene age, have left the Pleistocene terraces as a series of northeast-southwest-trending platforms and ridges adjacent to the Rio Grande floodplain (see Fig. 74).

The Site 32 platform is roughly rectangular in plan view with opposite corners oriented generally north-south and east-west (hereinafter direction will be given based on grid north, which is oriented to the northeast). The northern side of the area is bordered by the toeslope of a higher, older terrace scarp. The western side is a sideslope formed by a deep, linear arroyo. The southern side is the noseslope of the platform, the toeslope of which merges with a lower Holocene terrace. The east sideslope is irregular, being formed by a dendritic arroyo (see Fig. 74).

The Site 32 platform is somewhat atypical of most of the other summit platforms in the area. The surface of Site 32 is mantled by up to 1 m of eolian sands rather than gravels. In addition, there is a small knoll rising about 1 m above the general surface of the platform, located in the southeastern corner of the site on the shoulder of the platform (see Fig. 74). On the next summit platform east of Site 32 (hereinafter referred to as the east platform), some eolian material and a similar topographic high on the shoulder is apparent.

The interpretation for the above-mentioned anomalies is as follows. In post-Picacho, pre-Fort Selden times, a roughly east-west-trending channel was cut across the Picacho-Gold Hill surface (Figs. 74 and 75b). The resulting surface was not cut as deep as the next lower terrace. The knolls on the noseslope side of the platforms are remnants of the south side of this channel or swale.

The next step in the geomorphic development of the site was emplacement of the lower terrace adjacent to the noseslope of Site 32 (this terrace is also apparent adjacent to the noseslope of the east platform; see Fig. 74). This terrace is considered to be the Leasburg (which would be the older of the "lower terrace sequence" of Kottlowski 1958) (Fig. 75c).

KEYSTONE DAM PROJECT
MESILLA VALLEY
DIAGRAMMATIC CROSS SECTION

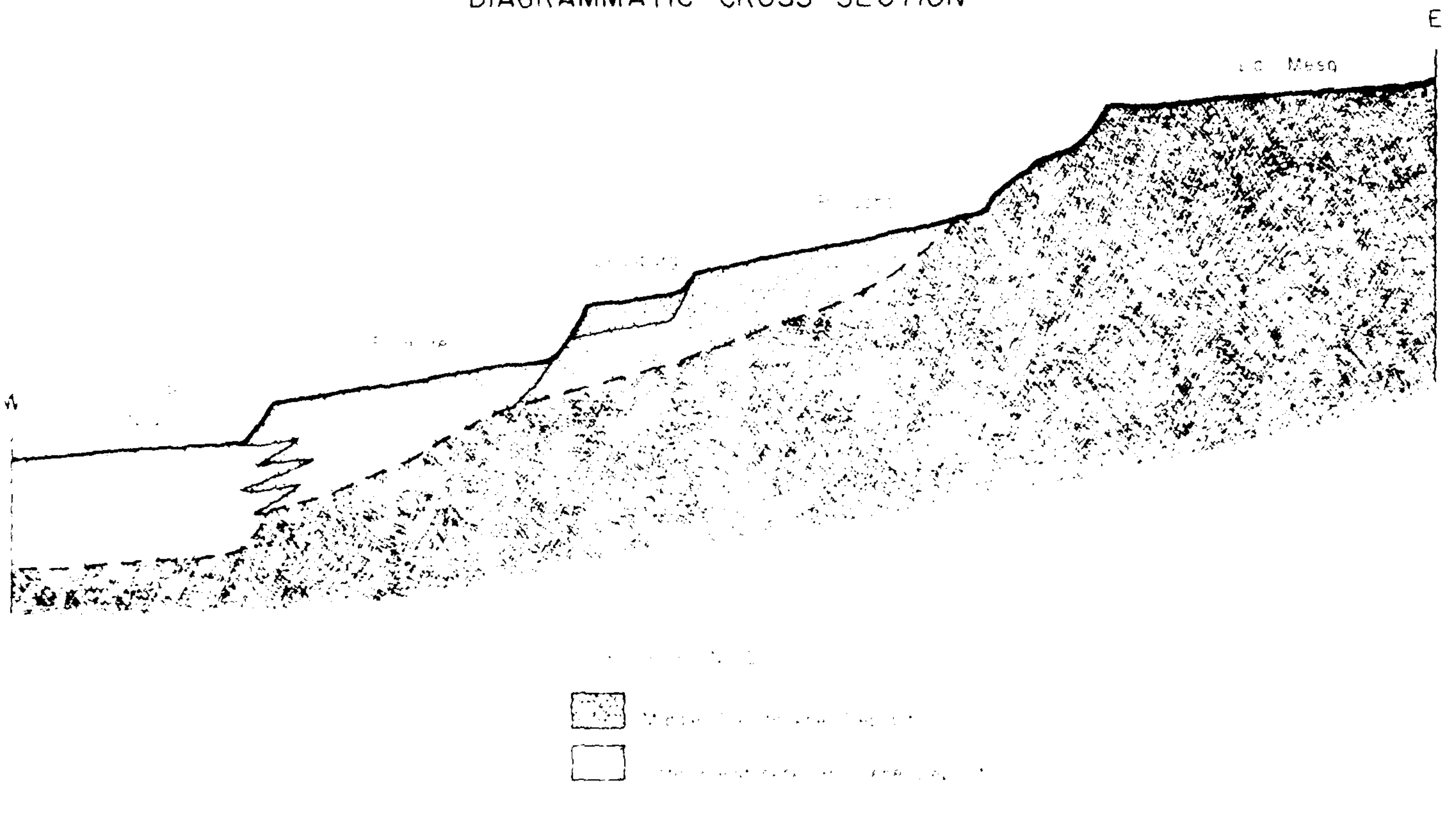
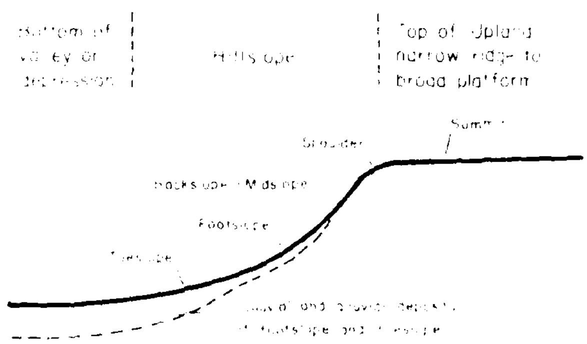


Figure 72

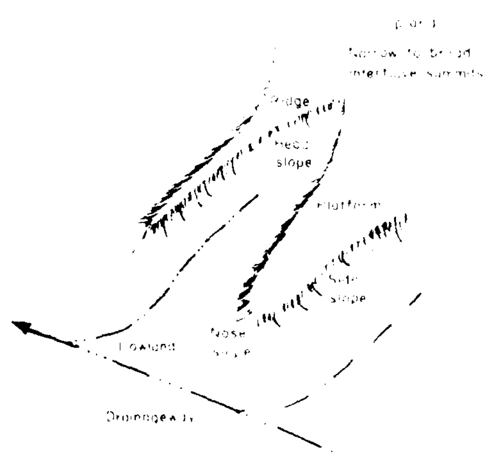
Figure 73

KEYSTONE DAM PROJECT
HILLSLOPE TERMINOLOGY

HILLSLOPE PROFILE



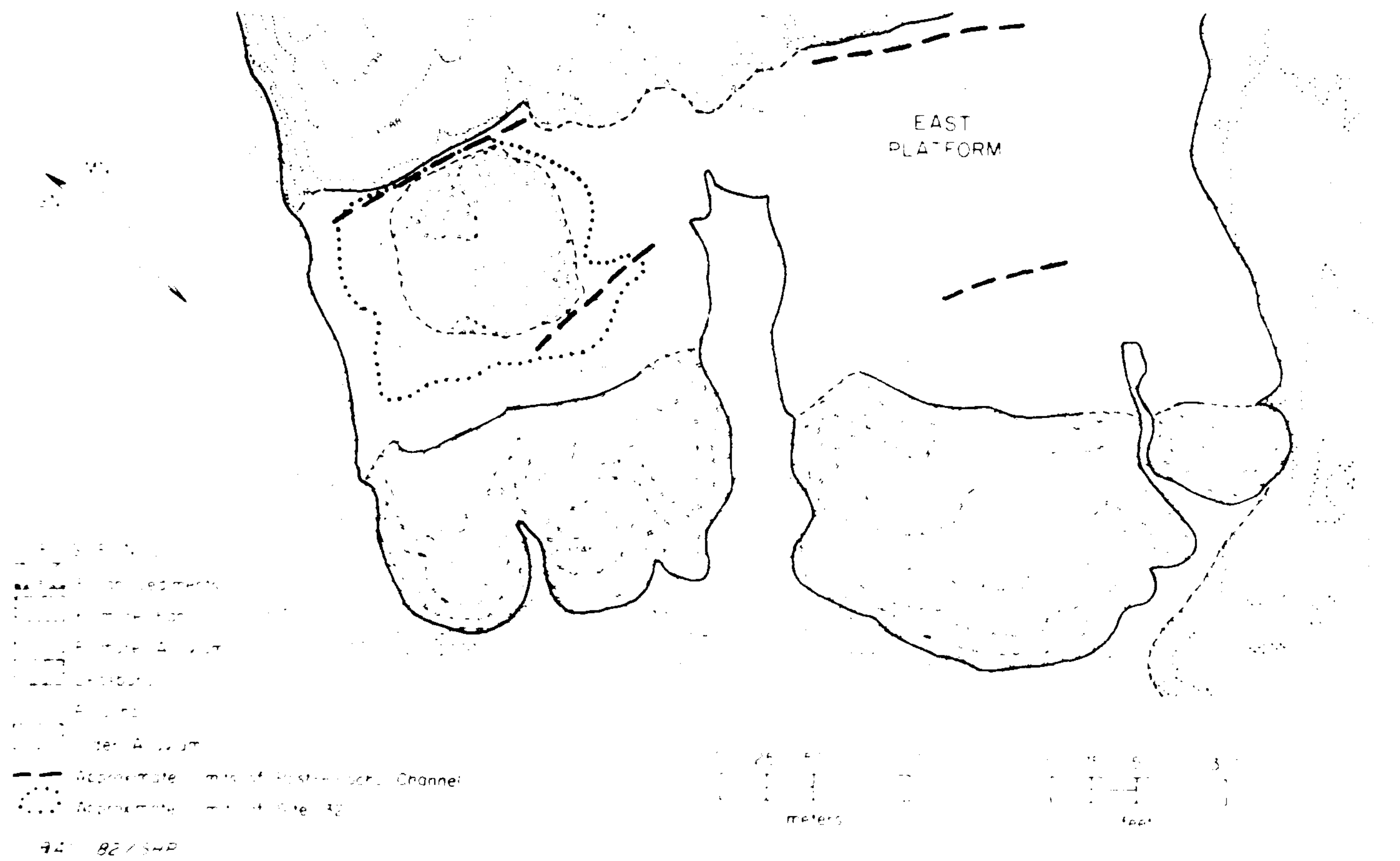
PLAN VIEW OF HILLSLOPE



Adapted from

Figure 74

KEYSTONE DAM PROJECT
SITE 32 & SURROUNDING AREA
TOPOGRAPHIC & GEOLOGIC MAP



Downcutting followed the emplacement of the Leasburg terrace. During this cycle of erosion, the large arroyo west of Site 32 probably developed as did the large drainage on the east side of the east platform.

Development of the drainage east of the east platform resulted in the formation of the fan at the mouth of the drainage. It is in this large fan that Sites 33 and 34 (O'Laughlin 1980) are located. This fan is probably the equivalent to the Fillmore surface and deposits (i.e., the younger of the "lower terrace sequence" of Kottlowski 1958) (Fig. 75d).

It is considered that for some time the Site 32 platform and the east platform were one continuous surface. The arroyo that now separates the two platforms is considerably smaller in areal extent than the arroyos to the east and west, suggesting that the middle arroyo is younger. In addition, the linear nature of the two larger arroyos suggests that they formed during a period of rapid lowering of the local base level (i.e., during post-Leasburg downcutting of the Rio Grande). The dendritic nature of the middle arroyo suggests slower entrenchment during a period when the base level was relatively stable.

Post-Leasburg downcutting occurred in the early Holocene. Therefore, it is possible that the Site 32 and east platforms were connected during the middle, and perhaps late, Holocene, which would have been during the early human occupation of the site.

Deposition of eolian sediments, ubiquitous at Site 32, occurred during the middle and late Holocene. These sediments fill the swale cut into the Picacho-Gold Hill alluvium (Fig. 75e).

SITE STRATIGRAPHY

The stratigraphy of Site 32 is relatively uniform and straightforward throughout (see Fig. 7). An interpretation of the depositional events is more difficult, but this should not affect the archeological interpretations.

Below the sediments containing the archeological material at Site 32 are at least 6 m of bedded cobbles, pebbles, sands, silts and clays. The deposits are alluvial sediments of the Rio Grande deposited as a result of its aggradation during Picacho-Gold Hill times (late Pleistocene).

In the excavations and backhoe trenches, five stratigraphic units with a superimposed soil profile were identified. The strata are numbered 1-5 (oldest to youngest). Strata 1-3 are sands and gravels of the Picacho-Gold Hill alluvium. They were eroded by the post-Picacho channel which cut across the platform. Strata 4 and 5 are Holocene eolian sediments inset against Strata 1-3.

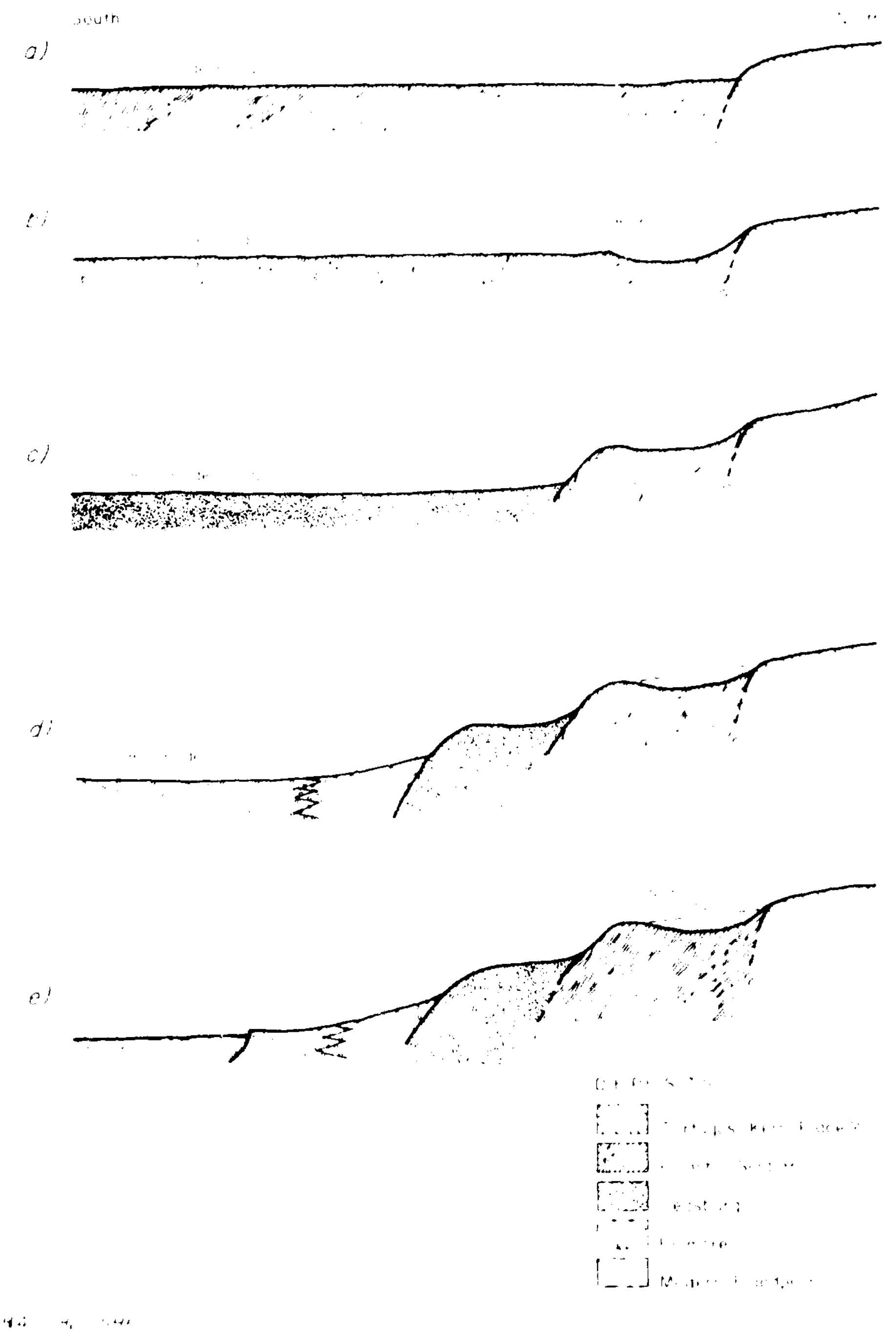
Stratum 1 is a gravel deposit commonly encountered at the base of the excavations and trenches, generally about 1 m below the surface. The unit is composed of limestone, metaquartzite, rhyolite and chert cobbles generally 5-20 cm in diameter. The gravels are generally stained white on the outside owing to the high carbonate content of the fine-grained sediments at the site.

Figure 75

KEYSTONE DAM PROJECT

GEOMORPHIC DEVELOPMENT OF SITE 32

DIAGRAMMATIC CROSS SECTIONS



Stratum [illegible] is a gravelly sand overlying Stratum 1. In the excavation areas, the unit [illegible] generally 10-20 cm thick although it is missing in some exposures. In these areas, the [illegible] contact represents the post-Picacho channel-cutting erosion surface. In the knoll [illegible] the southeastern corner of the site, Stratum 2 can be observed within Picacho-Gold Fill [illegible], overlain by Stratum 3 (see Fig. [illegible]). Stratum 2 contains 10-30 percent pebbles [illegible] in diameter). This unit is commonly found in the excavation areas lying immediately below the Stratum 4 eolian sands.

Stratum 3 is a gravel unit similar to Stratum [illegible]. The unit is exposed in the knoll where it crops out at the surface. Stratum 3 was almost entirely removed during the post-Picacho erosion. A few remnants of these gravels are apparent in exposures away from the knoll, but, for the most part, the unit is not found in the excavation area (see Fig. 7).

Stratum 4 is a calcareous sand deposit with a few scattered pebbles [illegible] in diameter). This unit, which contains the archeological material, is considered to be eolian because of its uniform texture and sorting. The pebbles are from [illegible] wash. Stratum 4 is generally [illegible]-80 cm thick. Along the margins of the [illegible] platform, particularly along the eastern side, the unit thins due to [illegible]. In some areas (e.g., Backhoe Trenches B and C), Stratum 4 has been completely removed [illegible] exposed at the surface.

The presence of archeological features within but not at the base of Stratum 4 suggests that the sands have been accumulating since before the occupation. However, lower Stratum 4 is probably not significantly older than the archeological material.

Stratigraphic correlations of archeological materials within Stratum 4 were virtually impossible owing to the homogeneous nature of the deposit. Several "strata" were identified within this unit in the field. These strata are, however, [illegible] superimposed [illegible] Stratum 4. These soil horizons are of no [illegible] with Stratum 4.

The soil within Stratum 4 is very weakly developed. There [illegible] of A [illegible] horizon development, based primarily on color (see Table [illegible]). There is also some suggestion of calcium carbonate accumulation in the lower part of the profile, again based on color. Laboratory data (see Table [illegible]) indicate some increase in carbonate content in the B1 and B2K horizons but no increase between the B1 and B2K, although there is an increase in color value (dry) between these horizons (see Table [illegible]).

Noted in some exposures were areas of considerable calcium carbonate accumulation, typical of a much better developed soil. These occurred in patches a few tens of centimeters to over 1 m across. These bodies seemed to occur in places of the more typical, subtle zones of calcium carbonate accumulation noted above. This carbonate accumulation was most common in the northern end of the site near the prominent, older terrace scarp. This phenomenon may be related to perturbations in groundwater movement due to the scarp and/or subtle textural changes in the Stratum [illegible] sediments.

The weakly developed nature of the soil formed in Stratum 4 should not be taken to suggest that Stratum 4 is very young. In the [illegible] area, it has been demonstrated that soils formed in highly calcareous materials of mid-Holocene age are very weakly developed (Entisols) (Gile et al. 1981:[illegible]).

In BHT I, which cuts into the scarp on the northern side of the site, there are several gravel lenses that appear to intertongue with Stratum 4. It was not possible to determine the depositional significance of these gravels, but the indications are that they are reworked Picacho gravels derived from the face of the scarp during Stratum 4 deposition.

Stratum 5 is the youngest deposit at Site 32. This unit consists of discontinuous, cross-bedded sand deposits found around the base of the low shrubs that grow on the site. These are referred to as coppice dunes by Gile et al. (1981:114-117) and are considered to be of Historic age.

SUMMARY AND CONCLUSIONS

The Keystone Dam Site is located within the southern Mesilla Valley region of the Rio Grande. Within the valley are a series of late Quaternary deposits and associated geomorphic surfaces. Site 32 is located on an eroded remnant of the Picacho-Gold Hill surface, a late Pleistocene terrace ubiquitous along the Rio Grande between El Paso and Las Cruces.

At Site 32, the terrace has undergone considerable dissection since formation. A wide, shallow channel was cut across the surface shortly after Picacho deposition but before the next major stage of downcutting (Leasburg). Several stages of Holocene arroyo cutting have further dissected the terrace in the area of Site 32. Some of this arroyo cutting possibly occurred during occupation of the site.

Occupation of Site 32 occurred primarily within the swale and onto the Picacho surface. Immediately prior to and during the habitation of the site, the area slowly aggraded with eolian sediments. An arroyo on the eastern side of the site cuts through these eolian sediments. This suggests that the site may have continued to the east, although it probably did not extend to the east platform.

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APPENDIX B: Macrobotanical Remains Recovered by Flotation

Mollie S. Toll

(Castetter Laboratory for Ethnobotanical Studies, Technical Series #68)

INTRODUCTION

Flotation results are reported here from a largely Archaic site located on a Pleistocene terrace east of the Rio Grande in northwestern El Paso, Texas. Site 32 is one of several sites affected by the Keystone Dam Flood Control Project. These sites are situated in an intermontane lowland at an elevation of about 1140-1173 m (3740-3850 ft). The Chihuahuan Desert floristic community here is a desert shrub association with few grasses; creosotebush (Larrea sp.) and ocotillo (Fouquieria splendens) predominate on ridgetops and slopes, while mesquite (Prosopis glandulosa) and yucca (Yucca sp.) are more common where eolian sand dunes have accumulated (see O'Laughlin 1980:17-18). Several environmental zones offering further economic resources are located within a reasonable foraging distance of 6 km. These include cacti (Opuntia sp.) and leaf succulents (Agave, Dasylirion, Yucca) at higher elevations, and dense patches of mesquite, tornillo (Prosopis pubescens) and cattail (Typha) in the river valley (O'Laughlin 1980:29-30).

Another Archaic site in the vicinity was found to contain small circular brush and mud houses with associated outdoor activity areas and storage pits (O'Laughlin 1980). Sampling of paleobotanical remains at Site 32 was intended to contribute to functional interpretation of food processing features, and to expand documentation of economic plant species utilized at such sites. During excavation, samples were taken from all undeflated features and from on-site controls (stratigraphic columns) as well as off-site controls. No clearly delineated floors or outdoor use surfaces were encountered.

Since preservation of prehistoric botanical materials was poor at other Keystone Dam sites, flotation analysis at Site 32 was undertaken as a pilot study of a limited number of high priority proveniences, with further analysis to follow if productivity of botanical artifacts was sufficient. Samples investigated included five from features, four nonfeature controls, and two off-site controls.

METHODOLOGY

During the fieldwork several matrix samples (including #4, 11 and 12) were processed in the field laboratory. Due to the need for conserving water, a simple flotation system following that of O'Laughlin (1980:87) was used. The matrix was first screened through a 1/4-in or 1/8-in mesh. The matrix passing through the screen was measured as to volume and placed in a bucket (approximately 0.5 l was processed at a time). Water was then added and the mixture stirred so the lighter material floated to the top. The water and floating material was then poured off through a fine mesh cloth (ca. 0.3 mm). This process was repeated three times, by which time little or no material floated. Material caught on the cloth was allowed to dry thoroughly and then was gently brushed off into a labeled plastic vial. The matrix which did not float was dried, repackaged and retained for further study. In the laboratory in Austin, the floated samples were transferred from vials to small envelopes.

After returning from the field, Prewitt and Associates, Inc. staff members decided to change to a second water separation technique which potentially would be more efficient in terms of time and effectiveness. All remaining samples were processed by this second technique. The system chosen, currently used by the Texas Archeological Research

[illegible], utilizing a form of the flotation device described by Watson [illegible]. The [illegible] is [illegible] separated into two sections by an [illegible]. Water enters the [illegible] through three parallel, horizontal [illegible] pipes [illegible] drilled in the top of each. The far end of each pipe is capped. [illegible], water spills over into the second chamber and may be drained through [illegible]. [illegible] agitation of water is created by [illegible] water [illegible] the [illegible]. [illegible] is placed on the [illegible] and the matrix is poured onto [illegible]. The light material floats [illegible] over [illegible] which crosses the dividing [illegible]. In the second chamber a [illegible] was placed to catch the floated material. [illegible] in the [illegible] chamber [illegible] soil particles larger than [illegible] [illegible] recovered or discarded. This process resulted in the collection of two [illegible], the heavy fraction caught in the [illegible] mesh screen, and the light fraction [illegible] the [illegible] screen. The heavy fraction passing through the [illegible] mesh [illegible] was flushed out of the first chamber and discarded. Both the light and heavy fractions were [illegible] and bagged after being allowed to dry.

Samples selected for initial analysis were first sorted by particle size [illegible] of graduated geological screens (mesh sizes of 4.0, [illegible], [illegible] and [illegible] mm). Each sample was sorted under a variable power binocular microscope. Seeds and distinctive [illegible] were removed during an initial pass-through at 10x magnification. Particles were then rolled over together to expose different orientations of cryptic and partial [illegible]; this second review sometimes revealed small numbers of potentially identifiable [illegible]. Seed taxa were identified at [illegible]-40x magnification. In most cases, the [illegible] was determined at least to family, and usually to genus or species, level. The [illegible] system devised by [illegible] (1968) was used. Taxonomy and [illegible] nomenclature follow Kearney and Peebles (1964), and common names were used [illegible] to the *Field Guide to Native Vegetation of the Southwestern Region* (U.S. Department of Agriculture [illegible]). Seeds and other plant parts were also described as to their [illegible], [illegible], charring, and retention of such characters as hairs and shiny [illegible]. [illegible] of certain non-floral items were recorded and their relative [illegible]. These included insect parts, [illegible], feces [illegible] or insects, and [illegible]. Such information was recorded with the hope of [illegible] causes of disturbance [illegible] record.

When samples were too large to allow total sorting within a reasonable amount of time, a subsample of the content was inspected and an estimated number of seeds determined for the entire sample. Because the soil samples varied considerably in volume, it [illegible] to [illegible] the estimated number of seeds recovered per sample to a seed [illegible] per [illegible]. This was accomplished by dividing the estimated number of seeds by [illegible] liters. For example, if [illegible] *Chenopodium* seeds were recovered [illegible] percent [illegible] sample of a [illegible] flotation sample, the estimated number of *Chenopodium* seeds was [illegible], which the estimated number [illegible] divided by [illegible] = [illegible] seeds.

[illegible] samples [illegible], [illegible] feature [illegible] contained [illegible] [illegible]. The very large [illegible] was floated in [illegible], [illegible]. From each [illegible], a sample of [illegible] pieces of charcoal was identified [illegible] the 4-mm mesh screen, and [illegible] the [illegible]-mm mesh screen. Each specimen was snapped to expose a fresh transverse section and identified at 40x (Western 1963; [illegible] 1976).

RESULTS

Features

Sample #4 from Feature 5 includes fill from a shallow basin-shaped pit containing fire-cracked rocks. Ground and chipped stone artifacts were found in the pit, but the fill was otherwise indistinguishable from the surrounding matrix and contained no ash or charcoal. This suggests that the fill generated during feature use has been eroded away and later replaced with noncultural eolian deposits. The presence of a variety of modern annual weed seeds (including inedible taxa and an introduced species) provides some corroborative evidence for such a sequence of events. Nonbotanical inclusions (insect parts, cocoon or egg case fragments, and numerous scats) further reflect expected contemporary biological activity just below the present ground surface.

Sample #11 from Feature 27 documents a similar but smaller pit filled with fire-cracked rocks. Feature 27 lies a little deeper (25 to 40 cm below the present ground level) and perhaps has escaped some of the erosional processes at work on Feature 5 (darker stained sand with charcoal flecks constitutes the fill). Botanical remains consist of a single modern spurge seed and abundant modern root material.

Feature 21 consists of a concentration of mostly unfractured limestone cobbles. Sample #12, from dark-stained soil underlying the cobbles, contains small numbers of unburned seeds, including both edible (goosefoot and hedgehog cactus) and unpalatable (trailing four o'clock and scorpionweed) taxa.

Feature 31 is a concentration of rocks, many of which are heat-fractured. Sample #1. was taken from fill soil only slightly darker than the surrounding matrix. Closeness of the feature to the modern ground surface (10-20 cm) is reflected in rodent and root activity observed during excavation, and in flotation evidence, including abundant roots, insect detritus, feces, modern weed seeds and creosotebush fruits.

Feature 32 is a large circular pit filled with heat-fractured rocks. Dense packing of the rocks may have limited the amount of rodent disturbance, but proximity to the surface (as close as 5 cm) is evident in the abundance and diversity of modern vegetation material, as well as insect pieces and scats. Numerous annual weeds are represented, in addition to creosotebush. After radiocarbon and pollen samples were removed, most of the remaining soil (74.5 l) was floated, and the entire sample (#.8, Bags 1, 2 and 3) analysed. Absence of any charred seeds from this very large sample is a convincing indication that cultural botanical material is not retrievable in significant quantities from this site. Clearly, any archeological seeds which have survived post-occupational geomorphic processes and biological degradation are present in very low density indeed, if at all. This feature is the only provenience at Site 32 containing abundant charcoal in flotation. Examination of a sample of this charcoal (20 pieces from each of the three lots processed) revealed that it all conformed to a single nonconiferous type (two pieces, or less than 1 percent by weight, were completely unidentifiable). Specimens are in very poor condition as they are friable and tend to disintegrate into short longitudinal splinters. Many appear to have been burned green and are split where they have expanded rapidly along radial axes. The type appears to be ring-porous and is characterized by multiseriate rays and large solitary pores. *Prosopis* (mesquite and tornillo) makes up the 1.[illegible]

of charcoal in nearby, generally contemporaneous Keystone Dam Sites 33 and 34 (80 percent of identified woody perennials, occurring in over 50 percent of samples from each occupational zone; O'Laughlin 1980:83). The wood type present in Feature 32 is generally not inconsistent with identity as Prosopis, but its condition is too poor to permit positive identification.

Nonfeature Controls

Two flotation samples were analyzed from Column A, approximately 5 m south of the southern extent of the main site area. Artifacts and fire-cracked rocks were present on the surface here but were absent from strata below. Sample #40 from Level 2 (12-32 cm below surface) and #41 from Level 3 (32-52 cm below surface) both contained few seeds, all of which appear to be modern contaminants (Table 38). Root and rodent disturbances were noted during excavation and were evident in flotation residue. Insect activity was also extensive in these levels (body parts, larvae cases, and tiny feces were abundant) and snail tests were recovered from Level 3.

Column C was located adjacent to Backhoe Trench A in the central site area. Artifacts and features were present close to the Column C location, and the darker gray coloration of column strata was suspected to be related to cultural activity. Botanical remains were sparse and clearly modern (Table 38), while signs of recent insect and rodent activity were abundant.

Off-site Controls

Two samples were processed from terrace locations about 100 m to the north and south of Site 32. Both terraces share a similar vegetation association (creosotebush-yucca-ocotillo) with the actual site area but should not be influenced by prehistoric site-related activity. No cultural materials were seen either on the surface or in the subsurface strata of the control columns. Both samples #15 and #19 were taken from levels close to (10-20 cm below) the modern ground surface and contained a wide variety of clearly modern botanical debris, largely annual weeds but also including creosotebush and a cactus (Table 38). Insect detritus was also abundant.

DISCUSSION

Botanical materials retrieved from flotation samples at Site 32 include only unburned seeds and other plant parts from annual weeds, a cactus and two woody perennials common in the site area today. The majority of taxa and 88 percent of all seeds recovered (Table 38) are unpalatable weeds, variously stickery, hairy and/or toxic. Russian thistle (Feature 5) is a clear indicator of modern contamination; this species is a weed introduced into the North American continent in the nineteenth century.

While remains of a small number of potential economic species are included in the Site 32 assemblage, there is no reason to associate these with cultural activity at the

TABLE 38
FLOTATION RESULTS

	Edible Taxa				Nonedible Weeds										Total Seeds	
	Chenopodium goosefoot	*Portulaca* purslane	*Echinocereus* hedgehog cactus	*Mentzelia* stickleaf	*Allionia* trailing four o'clock	*Bahia* bahia	*Euphorbia* spurge	*Medicago* medic	*Phacelia* scorpionweed	*Salsola* Russian thistle	Others	Unknowns & Unidentifiable	# Taxa	# Taxa Burned	Actual Count	Estimated No./Liter
Sample #4 Unit 2 Feature 5				1/0.4	25/10.0	1/0.4	2/0.8		2/0.8	1/0.4			6	0	32	12.8
Sample #11 Unit 2 Feature 2[illegible]							1/0.2						1	0	1	0.2
Sample #12 Unit [illegible] Feature [illegible]	1/0.5		1/0.5		3/1.5		1/0.5		3/1.5				[illegible]	0	9	4.5
Sample #1[illegible] Off-site Control Col. A, Lev. [illegible]	[illegible]	[illegible]	[illegible]		2/0.6		10/7.7	1/0.3	[illegible]			+[1]	8	0	21	13.2
Sample #19 Off-site Control Col. B, Lev. [illegible]					37/10.6	40/11.4	9/2.6		[illegible]		+[2]		4	0	91	26.0
Sample #[illegible] Unit [illegible] Feature [illegible]	[illegible]	[illegible]			11/1.8		1/0.3				+[3]		5	0	19	4.1
Sample #28 Unit 2 Feature 32				1/0.02	29/0.5	40/0.7	1/0.2		15/0.3		+[4]		8	0	86	1.5
Sample #40 On-site Control Col. A, Lev. 2							1/0.2						1	0	1	0.2
Sample #41 On-site Control Col. A, Lev. 3			4/0.8				2/0.4					+	3	0	6	1.2
Sample #48 On-site Control Col. [illegible], Lev. 2									1/0.3				1	0	1	0.3
Sample #49 On-site Control Col. [illegible], Lev. [illegible]			1/0.[illegible]										1	0	1	0.[illegible]

[1] [illegible] fragments. [2] *Eriogonum* flowers. [3] *Larrea* seed pods. [4] *Larrea* seed pods, immature modern Compositae achenes, and *Eriogonum* flowers.

site. Potential economics include Echinocereus (hedgehog cactus, with reportedly delicious fruits; Standley 1911) and three annual weeds utilized for greens and/or seed crops (Chenopodium, Portulaca, and Mentzelia; Castetter and Underhill 1935). Other relatively abundant local plant resources offer greater nutritive return for energy expended during gathering and processing (notably mesquite, yucca and other leaf succulents, and prickly pear cactus). Ethnographic studies confirm that these taxa have constituted the botanical focus of local hunter-gatherer economies (see especially Basehart 1974). While cultural plant materials at other Keystone Dam Archaic sites are sparse, nonweedy taxa (including mesquite, cacti and several leaf succulents) form the majority of cultural plant remains (O'Laughlin 1980). A review of plant remains from archeological sites in the Chihuahuan Desert floristic zone (Table 39) reveals that a similar complex of wild taxa predominates at better preserved (Sevilleta Shelter and LA 282) and better sampled (Keystone Sites 29, 33 and 34) sites, regardless of time period. Open, shallow sites of all time periods (this study, White Sands, La Jolla) have very few cultural plant remains, and weedy annual herbs form the majority of taxa. O'Laughlin notes that among unburned seed remains (which are not reported in his data tables) annual weeds also predominate at the nearby Keystone Dam sites (1980:89).

In comparison with other sites where inhabitants drew from a similar resource base, whole taxonomic groups suspected to be important in the prehistoric economy are entirely missing at Site 32. There is good reason to believe poor preservation is to blame for this patterning and that all botanical materials recovered to date at this site (with the exception of charred wood) are related solely to modern biological activity in the archeological deposits. Donaldson (1981) has demonstrated elsewhere that of a series of site types classified on the basis of cultural period and depositional conditions, shallow deflated structureless sites of the Archaic period are most susceptible both to degradation of subsistence evidence and to contamination by contemporary plant debris.

At Site 32, complete sorting of a single very large sample consisting of over 70 l of soil provides some measure of the scarcity of cultural botanical remains in this site. Lack of prehistoric plant specimens other than charcoal indicates with some reliability that significant quantities of such materials are not retrievable without greatly increasing both sample number and sample size (essentially entailing floating most of the site deposits). In the absence of such a sampling universe, analysis of a small number of additional flotation samples is not warranted, and investigation can reasonably cease at the present level.

TABLE 39

PRESENCE OF WILD PLANT TAXA IN FLOTATION ASSEMBLAGES FROM CHIHUAHUAN DESERT ARCHEOLOGICAL SITES[a]

Project Location	Site(s)	Period	n of samples	Woody Perennials: Atriplex	Larrea	Prosopis	Rhus	Juniperus	Economic Monocots: Yucca	Scirpus	Sporobolus	Cacti: Opuntia	Echinocereus	Economic Annual Weeds: Chenopodium	Amaranthus	Portulaca	Mentzelia	Cleome	Nicotiana	Descurainia
[illegible] Dam NW El Paso [illegible] (this study)	Site [illegible]	Archaic	11		+								•	•		+	+			
[illegible] Dam[b] [illegible] [illegible]	Sites [illegible]	Archaic	1?4	•*	•*	•*			•*,[c]	•*		•*	•*[d]	•*		•*				•*
[illegible] central NM [illegible]	[illegible] scatter w features	Archaic	4[e]											•		•				
	[illegible] lithic scatters w features	Approx. [illegible]	[illegible][e]	•	•						•		•	•						
[illegible] central NM [illegible] 1980)	LA [illegible]	[illegible]	5	•			•*	•*					•*	•*		•*		•*	•	
[illegible] central NM [illegible]	[illegible] sherd & lithic scatters	[illegible] II	[illegible]											•*		•*				
NM [illegible] central NM [illegible]	LA [illegible]	Late [illegible]	22		•	•*		•*	•*	•*	•*	•*	•*	•	•*					

•[illegible] specimens charred. [a]Probable weedy contaminants are ommitted from this table. [b]Only [illegible] taxa were reported. [c]Leaf parts and possible carpel fragments recovered with charcoal. [d]*Echinocactus*. [e]Scanned only.

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APPENDIX C: Pollen Analysis

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(Castetter Laboratory for Ethnobotanical Studies, Technical Series #70)

INTRODUCTION

Eleven pollen samples from Site 32 of the Keystone Dam Project Mitigation Program were submitted to the Castetter Laboratory for Ethnobotanical Studies for processing and analysis. Five samples were from features, four from columns within site perimeters taken for feature controls, and two were control samples from off the site. The analysis of these samples was part of a pilot study to assess the state of preservation of botanical remains at the site.

Site 32 is located on a ridgetop overlooking the floodplain of the Rio Grande near El Paso, Texas. The vegetation of the area is dominated by shrubs such as creosotebush (Larrea tridentata) and ocotillo (Fouqueria splendens) and is described in detail by O'Laughlin (1980).

METHODOLOGY

A modification of the basic method for pollen extraction described by Mehringer (1967) was used:

(1) A 50-gm soil sample was taken from each bag and weighed on a triple beam balance.

(2) Each sample was washed through a 180-mesh brass screen with distilled water into a 600-ml beaker.

(3) Removal of carbonates: About 100 ml of 40 percent hydrochloric acid (HCl) was added to each beaker to remove calcium carbonates and to cause disaggregation of soil particles. When bubbling action ceased, each beaker was filled with distilled water and the sediments allowed to settle for at least three hours. The water and dilute HCl was carefully poured off after the settling, leaving the sediments and the pollen behind in the beaker.

(4) Rinse: Each beaker was filled again with distilled water, stirred, and allowed to settle for three hours before pouring off.

(5) Swirl: Beakers were filled about one-third with distilled water and stirred with clean stirring rods without creating a vortex to suspend sediments and pollen. One second after stirring stopped, the lighter soil particles and the pollen grains were poured off into a second clean beaker. This procedure was repeated several times to physically separate the heavier sand grains from the lighter sediments and the pollen grains.

(6) Removal of silicates: Approximately 50 ml of hydrofluoric acid (HF) were added to each beaker containing the lighter sediments and allowed to sit overnight. The samples were then rinsed with distilled water, allowed to sit three hours, and the water poured off. The sediments were transferred to 50-ml centrifuge tubes, rinsed and then centrifuged and the water poured off. Approximately 30 ml of HF were added to each test tube, stirred, and placed in a hot water bath for about 10 minutes. Tubes were then centrifuged and the HF decanted.

Rinse: Tubes were filled with distilled water, stirred, centrifuged and [illegible]. This was repeated twice.

(8) Removal of organics: Samples were rinsed with about 30 ml of glacial acetic acid, centrifuged and poured off prior to acetolysis. A fresh acetolysis solution was prepared, of nine parts acetic anhydride to one part of sulfuric acid. About 20-30 ml were added to each test tube, stirred, and placed in a hot water bath for about eight minutes. Tubes were then centrifuged, the liquid poured off, rinsed with glacial acetic acid, centrifuged again and poured off.

(9) Rinse: The centrifuge tubes were filled with distilled water, stirred, centrifuged and poured off. This was repeated twice.

(10) The samples were then placed in glass vials with glycerol for storage.

(11) Slides were prepared for microscope analysis with a [illegible] microscope at 200x, 400x and [illegible]x. Identifications were made using Kapp [illegible], unpublished key, and the comparative collection of southwestern pollen types in the [illegible] laboratory.

Slides from all the samples were made and then scanned for pollen. At least half of each slide was viewed at 200x to assess the condition and amount of pollen grains. Six of the eleven samples were chosen for complete analysis on the basis of apparent adequacy of pollen grains to count at least to 100 or because they were from features and obviously contained some pollen grains. The other five samples contained little or no pollen (Table 4).

TABLE 4

SCANNED SAMPLES WITH LITTLE OR NO POLLEN

Sample Number	Location
1	Unit 2, N[illegible]/W[illegible], Level 2, Feature 5
[illegible]	Unit 2, N10[illegible]/W[illegible], Level 2, Feature [illegible]1
[illegible]	Offsite Sampling Location F, Level 2
[illegible]4	Unit 2, N[illegible]/W[illegible], Level [illegible], Feature 31
[illegible]	On-site Sampling Column C, Level 3

Terminology follows Martin and Hutchins [illegible] and Field Guide to Native Vegetation of the Southwestern Region (U.S. Department of Agriculture 1974).

RESULTS AND DISCUSSION

Features

Of the six completely analyzed samples, three were from features (Features [illegible], 31 and [illegible]) and contained a few pollen grains and dense charcoal (Table 41). Feature 31 contained one cholla-type (Opuntia) pollen grain. Opuntia produces a few large pollen grains adapted to insect pollination (Wodehouse 1959). These pollen types are uncommon in non-archeological sediment samples but occasionally are found in modern surface samples. It is possible that the occurrence of Opuntia pollen from this sample is associated with the use of fruits, buds or stems of cholla-type cactus in or around this feature. Use of cholla cactus fruits, buds and stems is recorded for various southwestern Indian groups (Castetter 1935; Stevenson 1915). Bohrer (1972) reports that pollen is found on the fruits and stems of cactus and could be introduced into a site with these parts of the plant. The single grain found in Feature 31 at Site 32 may be evidence of usage of cholla-type cactus, but it is possible that it is only an accidental occurrence.

Control Samples

Three control samples were chosen for complete analysis. All of these samples contained insufficient pollen for a 200-grain count, but counts of 100 were reached on two slides. These two samples yielded quite inconsistent results (Table 41). Sample #7 contained high percentages of Cheno-Ams. Sample #30 contained high percentages of grass pollen. At Keystone Dam Site 33 there was also conflicting pollen evidence from two separate studies. Horowitz et al (n.d.) found high percentages of grass pollen from a preliminary study. They interpret this data to mean that the area supported a rich grassland at the time of occupation. Cully and Clary (1980) found high percentages of Cheno-Ams predominating throughout pollen columns at the site. It is not clear how much differential preservation and human activity have affected the pollen results at Site 33; however, the evidence seems to suggest an environment similar to that of the present throughout the time of occupation. At Site 32, the apparent disparity between the two samples could be due to several factors. A true sample of 200 grains was not obtained from either slide. When counting to 100 grains, the results may be skewed towards one taxa or another (Erdtman 1943). Corresponding flotation samples from the same levels contained evidence of intrusive modern flora (Appendix B) indicating that the differences in pollen percentages may be due to highly localized modern pollen rain. The low pollen counts, shallowness of sampling units, and evidence of modern contamination do not allow for interpretation of either economic usage of plant resources by site inhabitants or conclusions about past environment.

PRESERVATION

Only two of eleven samples contained sufficient pollen to reach counts of 100 grains. These results follow the pattern observed at Keystone Dam Site 33 where many samples had

TABLE 41

POLLEN COUNTS

Provenience	*Pinus* sp.	*Juniperus*	Cheno-Ams	Gramineae	High spine Composite	Low spine Composite	*Ephedra* (*nevadensis*) type	*Cleome*	*Opuntia* (cholla type)	Euphorbiaceae	Total
Sample 4, Unit 2, Feature 27	-	-	-	2	-	-	-	2	-	-	4
Sample 7, Off-site Control, Location A, Level 2	24	[illegible]	54	15	3	[illegible]	-	-	-	-	100
Sample 14, Unit 2, Feature 31	-	-	-	-	-	-	[illegible]	-	1	-	1
Sample 28, Unit 2, Feature 32	2	-	-	2	-	[illegible]	-	-	[illegible]	-	4
Sample 30, On-site Control, Column A, Level 2		-	3	75	[illegible]	[illegible]	-	-	-	-	100
Sample 38, On-site Control, Column C, Level 2	-	-	5	[illegible]	[illegible]	[illegible]	-	-	-	1	13

low pollen counts and exhibited characteristics of poor pollen preservation and differential destruction of less durable pollen types. As observed at Site 33, samples from Site 32 contained pollen grains degraded past the point of recognition and a low diversity of taxa. Several factors could be involved in the scarcity and poor preservation of pollen at the site. Coarse-textured soils may prevent accumulation of pollen by allowing the grains to wash through to lower layers or to be blown away and redeposited elsewhere. At Site 33, a sample from dune sands at Sampling Location 1 did not contain any pollen (Cully and Clary 1980). Lack of pollen in dune sands has been observed also in sites in northwestern New Mexico (Clary and Cully 1979; Cully and Clary 1981; Cully 198[illegible]). Pollen is best preserved in acidic soils. Under alkaline conditions, pollen is subject to destruction by bacterial and fungal activity (Dimbleby 1978). In exposed Archaic-period sites such as Site 32, alkaline soils in combination with moisture from precipitation may cause conditions which encourage fungal and bacterial activity. The results of this pilot study suggest that these destructive forces have been at work at Site 32 and that further sampling will not be successful.

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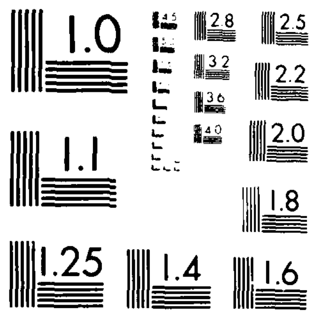

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APPENDIX D: Historic Artifacts

Ross C. Fields

INTRODUCTION

The Site 32 investigations yielded 69 twentieth-century artifacts (Table 42). Most of these are from the site surface and the uppermost excavation levels. Bioturbation and the looseness of the site soils undoubtedly account for the occurrence of some specimens in the lower excavation levels.

TABLE 42

PROVENIENCE OF HISTORIC ARTIFACTS

		Excavation				
Description	Surface	Level 1	Level 2	Level 3	Total	TOTALS
GLASS						
Containers	36 100.0%					36 100.0%
Windowpane		2 100.0%			2 100.0%	2 100.0%
Marble	1 100.0%					1 100.0%
Miscellaneous	2 100.0%					2 100.0%
METAL						
Shell bases	5 62.5%	1 12.5%	1 12.5%	1 12.5%	3 37.5%	8 100.0%
Cartridges	3 75.0%	1 25.0%			1 25.0%	4 100.0%
Slugs	5 41.9%	4 33.3%	1 8.3%	2 16.7%	7 58.3%	12 100.0%
Other		2 100.0%			2 100.0%	2 100.0%
BRICK		2 100.0%				2 100.0%
TOTALS	52 75.4%	12 17.4%	2 2.9%	3 4.4%	17 24.6%	69 100.0%

Glass

Five broken jars or bottles, with a total of 36 sherds, were found on the site surface. Other glass items recovered are (1) a complete glass marble, (2) two pieces of windowpane, and (3) two very small sherds which may be parts of jars or bottles.

Metal

Most of the metal artifacts reflect use of the site area for bird-hunting or target practice. Eight 12-gauge shotgun shell bases were found and bear the following head stamps: REM-UMC SHURSHOT (n = 5), WINCHESTER RANGER (n = 1), WESTERN FIELD (n = 1), and WINCHESTER NUBLACK (n = 1). The four 22-caliber cartridges recovered are head stamped with H (n = 3) and (n = 1).

Of the twelve lead slugs found, six are 22-caliber, one is 23-40-caliber, one is 32-caliber, one is a 45-caliber with a steel jacket, and three are unidentifiable fragments. The other two metal artifacts are a galvanized roofing nail and an iron eyelet.

Brick

Two fragments of modern brick were recovered. These were recovered from sample excavation unit N71/W110 with the windowpane fragments and the roofing nail and thus suggest the dumping of construction materials on the site.

APPENDIX E: Tabulation of Functional Attributes of Major Chipped Stone Tool Classes

KEY TO APPENDIX

Provenience:

N = North	S = Surface
W = West	BHT = Backhoe Trench
L = Level	

Marginal retouch, Feather scars, Step scars:

U = unifacial   B = bifacial

Edge angle:

A = 10-40°   B = 40-60°   C = 60-90°

Abrasion:

R = rounding   B = blunting

Length of functional edge, Maximum length:

(in millimeters)

Edge shape:

A = convex	B = concave	C = straight
D = recurved	E = sinuous	T = tip

Weight:

(in grams)

Raw material:

CH = chert	RH = rhyolite
QU = fine-grained quartzite	SS = sandstone
BA = basalt	LI = limestone
OB = obsidian	UN = unidentified

EDGE-MODIFIED FLAKES, CHIPS AND ANGULAR FRAGMENTS

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
3.490	64	104	S	B	B	-	U	-	50	C	63.5	97	SS
3.605	52	84	S	U	B	-	U	-	25	C	54.0	92	RH
3.615	144	104	S	-	C	B	-	-	31	A	38.5	51	CH
3.606	52	68	S	U	C	-	U	-	38	C	55.5	71	RH
3.79	112	128	S	U	B	B	U	-	49	A	30.0	54	CH
3.586	146	132	S	-	C	-	U	-	19	B	33.0	60	BA
3.197	116	76	S	-	B	B	-	-	47	C	43.0	69	RH
				-	B	U	-	-	24	E			
3.114	120	120	S	-	C	-	U	-	32	C	35.0	50	CH
3.606	52	68	S	-	A	B	-	-	24	A	32.5	61	CH
3.612	52	100	S	-	A	B	-	-	22	A	18.0	56	RH
3.53	76	104	S	-	B	-	U	-	31	A	34.5	64	BA
3.484	124	112	S	-	C	-	U	-	48	C	35.5	64	RH
				-	B	-	U	-	16	C			
3.319	148	92	S	B	B	-	-	-	20	C	31.0	52	BA
3.129	112	68	S	-	B	U	-	-	10	A	14.5	52	RH
3.199	68	92	S	U	C	-	-	-	31	C	19.5	47	SS
				-	B	B	-	-	24	A			
3.115	88	80	S	U	C	U	U	-	14	B	6.5	34	CH
				-	B	B	U	-	22	C			
3.154	92	76	S	-	B	B	B	-	34	C	4.5	41	CH
				-	B	U	-	-	36	C			
3.81	100	84	S	U	A	B	-	-	9	E	2.5	30	BA
3.516	60	104	S	-	C	B	U	-	15	B	4.0	24	CH
				-	C	-	U	-	14	B			
				-	B	B	-	-	32	A			
				-	B	B	-	-	17	C			
3.444	132	64	S	-	A	B	-	-	51	C	16.5	59	RH

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
3.123	108	128	S	-	B	B	-	-	63	A	25.5	57	SS
3.260	120	96	S	U	C	-	U	-	13	B	3.0	20	CH
				U	C	-	U	-	11	C			
3.265	100	96	S	-	C	-	U	-	24	C	2.0	26	CH
3.98	116	108	S	U	C	-	U	-	14	C	10.0	35	CH
3.330	96	112	S	U	C	-	U	-	16	A	2.0	20	CH
3.521	136	136	S	U	B	B	-	-	13	C	5.0	27	CH
3.456	152	128	S	U	C	-	B	-	8	A	1.0	12	CH
3.539	64	88	S	-	C	U	-	-	11	C	1.0	21	BA
3.533	120	136	S	B	A	-	B	-	16	A	1.0	13	CH
				B	A	-	B	-	8	A			
3.474	132	84	S	-	B	B	-	-	54	A	17.0	48	CH
				-	A	B	-	-	34	A			
3.442	136	96	S	-	C	U	-	-	22	A	6.0	26	CH
3.287	120	98	S	B	B	B	-	-	34	A	18.5	47	SS
3.171	124	100	S	-	A	B	-	-	38	A	12.5	42	RH
3.103	88	84	S	U	C	-	U	-	26	D	12.0	44	CH
				U	B	B	-	-	39	A			
3.116	104	88	S	U	C	B	-	-	23	C	8.0	34	BA
3.120	116	120	S	-	B	-	B	-	91	A	51.5	66	BA
3.180	68	80	S	-	B	-	U	-	40	B	113.0	80	RH
3.611	60	52	S	B	C	B	-	-	90	A	54.0	78	RH
3.268	88	128	S	-	A	B	-	-	67	C	99.0	91	RH
3.407	144	120	S	-	A	B	-	-	51	C	55.0	68	RH
3.120	116	120	S	-	B	U	-	-	26	C	80.5	66	CH
				-	A	B	-	-	30	B			
				-	C	B	-	-	23	C			
				-	B	B	-	-	37	C			
3.150	122	96	S	-	A	U	-	-	26	D	12.0	40	CH
3.437	128	108	S	-	-	B	-	-	-	T	3.5	25	CH
				-	A	B	-	-	23	A			

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Length Functional Edge	Edge Shape	Weight	Maximum Length	Raw Material
3.298	84	112	S	-	A	B	-	-	18	B	5.5	33	LI
3.303	104	108	S	-	A	U	-	-	29	A	8.0	32	CH
3.582	144	92	S	-	B	B	B	-	23	A	3.5	25	CH
3.314	92	120	S	-	A	B	-	-	15	C	6.5	30	CH
3.611	60	52	S	-	A	B	-	-	43	A	60.0	68	RH
3.255	96	96	S	-	A	U	-	-	99	A	60.5	74	RH
3.516	60	104	S	-	B	B	-	-	63	A	36.0	65	RH
3.512	60	100	S	-	B	B	B	-	110	A	53.0	69	RH
3.486	124	108	S	-	B	-	B	-	29	A	37.0	47	RH
3.203	124	104	S	-	B	-	B	-	32	C	21.5	46	CH
3.539	64	88	S	-	A	B	-	-	16	A	6.5	31	CH
3.486	124	108	S	-	A	U	-	-	40	C	5.0	47	QU
3.430	120	132	S	-	A	B	-	-	25	C	1.0	26	OB
				-	-	B	-	-	-	T			
3.486	124	108	S	-	B	B	-	-	40	A	9.5	57	CH
				-	-	B	-	-	-	T			
3.155	112	84	S	-	B	U	-	-	22	C	5.0	35	CH
3.613	116	132	S	-	A	B	-	-	11	C	1.5	23	CH
				-	A	B	-	-	9	C			
3.126	92	104	S	-	-	B	-	-	-	T	4.0	28	CH
				-	A	B	-	-	21	C			
3.198	80	84	S	-	A	B	-	-	14	C	3.0	24	CH
3.172	128	96	S	-	A	B	-	-	26	A	3.5	29	CH
				-	C	U	-	-	14	C			
				-	C	-	U	-	12	B			
3.265	100	96	S	-	A	B	-	-	47	C	27.5	54	RH
3.255	96	96	S	-	A	U	-	-	92	A	60.5	89	RH
3.112	120	120	S	-	A	B	-	-	67	A	22.5	74	CH
				-	C	-	U	-	14	B			
3.532	64	80	S	-	B	-	-	-	99	A	22.0	52	RH
3.198	80	84	S	-	B	-	U	-	32	C	42.0	56	RH

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
3.168	128	112	S	-	B	B	U	-	41	A	22.0	56	BA
				-	C	-	B	-	57	C			
3.193	72	76	S	-	B	B	-	-	42	C	31.0	50	SS
3.163	108	80	S	B	A	B	-	-	58	A	39.0	53	RH
3.450	128	94	S	-	A	B	-	-	39	C	17.0	48	BA
3.475	140	92	S	U	C	-	U	-	26	B	23.5	51	CH
				-	C	-	U	-	10	C			
3.172	128	96	S	B	B	-	-	-	85	A	31.0	63	SS
3.46	104	92	S	-	C	U	-	-	44	C	43.5	71	SS
				-	B	B	-	-	83	A			
3.149	96	84	S	-	B	B	-	-	31	C	14.0	41	CH
3.267	76	100	S	-	B	-	B	-	36	C	13.0	13	CH
3.46	104	92	S	-	B	B	U	-	22	C	15.5	41	CH
3.174	92	100	S	-	A	B	-	-	38	A	16.0	42	QU
3.136	108	72	S	-	A	B	-	-	34	C	28.0	54	RH
3.438	128	108	S	-	A	U	-	-	35	E	3.0	34	BA
				-	A	U	-	-	37	A			
3.416	124	60	S	-	A	-	B	-	30	C	14.5	46	CH
3.493	132	136	S	-	A	B	-	-	20	A	5.5	41	CH
3.41	92	80	S	-	A	B	-	-	37	D	25.5	56	BA
				-	B	B	-	-	24	C			
3.484	124	112	S	U	A	-	-	-	61	A	7.5	56	BA
				-	A	U	-	-	45	E			
3.579	116	68	S	-	A	B	-	-	61	A	12.0	41	CH
3.476	128	116	S	-	B	B	-	-	49	C	20.5	50	SS
3.445	128	132	S	U	B	B	B	-	35	A	2.5	25	CH
3.209	88	68	S	U	A	B	-	-	45	A	2.5	25	CH
3.430	120	132	S	-	A	U	-	-	16	A	0.5	14	CH
3.532	64	80	S	-	A	U	-	-	43	A	5.5	31	RH
3.598	116	52	S	-	B	B	-	-	33	D	8.0	36	SS
3.441	108	136	S	-	A	B	-	-	14	C	0.5	16	CH

Lot No.	Provenience N	W	L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
3.474	132	84	S	-	B	U	-	-	16	C	8.0	34	QU
3.412	64	84	S	-	B	B	-	-	31	A	2.5	24	CH
				-	C	B	-	-	12	B			
3.412	64	84	S	-	A	B	-	-	32	A	5.5	42	CH
3.267	76	100	S	-	A	-	U	-	18	A	1.0	29	CH
3.118	112	108	S	-	A	B	-	-	2	A	3.5	26	CH
3.521	136	136	S	-	B	B	-	-	35	E	20.0	43	CH
3.285	120	98	S	-	A	B	-	-	77	A	37.0	67	RH
				-	B	B	-	-	53	C			
3.521	136	136	S	-	B	B	-	-	35	E	20.0	43	CH
3.210	80	80	S	-	A	U	-	-	26	C	10.5	40	BA
3.332	132	92	S	-	A	U	-	-	9	A	6.0	34	BA
				-	A	B	-	-	21	C			
3.47	100	92	S	-	B	B	U	-	37	A	7.0	40	CH
3.442	136	96	S	-	A	U	-	-	11	B	1.0	19	CH
3.513	132	104	S	-	A	U	-	-	7	B	1.0	20	CH
				-	A	B	-	-	7	A			
3.477	124	124	S	-	A	B	-	-	33	C	11.5	39	CH
3.238	88	100	S	-	B	B	-	-	34	C	5.0	34	CH
				-	A	B	-	-	36	A			
[illegible].211	108	116	S	-	A	B	-	-	22	C	4.5	29	CH
				-	C	U	-	-	9	C			
[illegible].123	108	128	S	-	A	B	-	-	36	C	4.0	36	CH
				-	A	B	-	-					
3.192	72	92	S	-	A	B	B	-	[illegible]	[illegible]	9.0	36	CH
3.192	72	92	S	-	A	B	-	-	26	[illegible]	5.0	32	CH
				-	A	B	-	-	23	C			
3.549	148	132	S	-	A	B	-	-	23	A	1.0	19	CH
				-	B	B	-	-	14	C			
3.239	124	88	S	U	B	B	U	-	13	C	1.0	19	CH
3.172	128	96	S	-	B	U	-	-	33	A	6.5	33	CH

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
3.137	108	88	S	-	A	B	-	-	40	A	8.0	39	QU
3.588	148	112	S	-	B	B	B	-	44	A	7.5	38	RH
3.196	124	116	S	-	A	U	-	-	19	C	5.5	39	CH
3.478	136	116	S	-	B	B	-	-	42	A	4.5	43	CH
3.198	80	84	S	-	B	B	-	-	37	A	5.0	35	CH
3.476	128	116	S	-	A	B	-	-	18	C	3.5	20	CH
3.476	128	116	S	-	A	U	-	-	30	A	2.0	27	CH
3.278	88	120	S	-	B	B	-	-	28	A	4.0	30	CH
3.58	72	96	S	-	B	-	U	-	37	A	24.5	51	BA
3.472	128	100	S	-	C	-	B	-	19	C	3.0	30	CH
3.421	64	92	S	-	C	U	U	-	16	A	4.0	25	CH
3.299	88	124	S	U	B	B	-	-	36	A	4.0	32	CH
3.530	140	116	S	-	A	B	-	-	20	C	3.5	41	CH
3.161	112	88	S	-	B	B	U	-	28	B	12.0	32	CH
				-	C	B	U	-	32	A			
3.53	76	104	S	-	B	U	-	-	11	C	3.5	26	CH
3.613	116	132	S	-	A	B	-	-	20	C	1.5	26	CH
				-	A	B	-	-	20	C			
3.116	104	88	S	-	A	B	-	-	34	D	6.0	38	RH
3.53	76	104	S	-	A	B	B	-	32	C	8.0	42	BA
3.219	124	84	S	U	B	B	-	-	34	C	7.5	48	CH
				U	C	U	U	-	21	C			
				-	-	U	-	-	-	T			
3.539	64	88	S	-	B	B	-	-	46	A	6.0	33	CH
3.475	140	92	S	-	B	B	-	-	25	C	8.0	37	RH
3.161	112	88	S	-	C	-	B	-	19	C	7.0	44	CH
3.470	132	96	S	-	A	B	-	-	49	A	3.5	35	CH
3.472	128	100	S	-	B	B	U	-	26	A	7.0	29	CH
3.141	92	84	S	-	B	-	U	-	[illegible]	C	5.0	33	CH
3.74	112	112	S	-	A	B	-	-	28	A	3.0	[illegible]	CH
3.303	104	108	S	B	B	B	B	-	46	A	[illegible]	39	CH

Lot No.	Provenience N	Provenience W	[illegible]	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Length Functional Edge	Edge Shape	Weight	Maximum Length	Raw Material
3.84	13[illegible]	[illegible]	S	-	A	-	B	-	30	A	5.0	32	RH
				-	A	-	B	-	27	B			
3.448	144	84	S	U	C	-	U	-	28	A	3.0	33	CH
				-	-	-	B	-	-	T			
3.414	124	68	S	-	A	B	B	-	23	A	4.0	26	CH
3.253	122	98	S	-	A	B	-	-	42	A	2.5	21	CH
3.182	124	96	S	-	A	B	B	-	26	A	2.0	26	BA
				-	A	U	-	-	13	C			
3.293	104	116	S	-	A	B	-	-	23	A	2.0	23	CH
3.553	144	136	S	-	B	B	-	-	13	C	1.5	19	CH
3.306	92	92	S	-	C	U	-	-	11	C	1.0	18	CH
3.414	124	68	S	-	B	U	U	-	8	A	1.5	20	CH
3.476	128	116	S	U	A	B	U	-	17	C	1.5	25	CH
3.416	124	60	S	-	A	B	-	-	13	A	1.0	17	CH
3.613	116	132	S	-	A	B	B	-	21	C	1.0	21	OB
				-	A	B	B	-	16	C			
3.399	134	112	S	-	A	B	-	-	8	C	0.5	14	OB
3.546	108	132	S	U	A	-	B	-	86	A	20.5	52	BA
3.343	128	120	S	U	C	U	U	-	37	A	10.0	29	CH
3.524	80	116	S	B	C	B	-	-	44	C	40.0	60	RH
				-	A	B	-	-	58	A			
3.521	136	136	S	U	C	-	U	-	23	B	13.0	37	RH
3.289	88	112	S	U	B	-	U	-	18	A	16.5	42	QU
				-	A	-	B	-	12	C			
3.238	88	100	S	B	A	-	B	-	46	C	67.0	69	RH
3.143	100	76	S	U	C	-	U	R	80	A	66.0	57	CH
3.553	144	136	S	U	B	-	U	-	64	A	20.0	55	RH
3.111	120	120	S	U	A	-	B	-	65	E	6.5	41	CH
3.69	84	116	S	U	B	U	-	-	18	A	7.0	37	SS
3.182	124	96	S	U	B	-	B	-	47	C	21.5	55	RH
3.128	104	68	S	U	B	B	B	-	83	A	81.5	63	RH

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Length Functional Edge	Edge Shape	Weight	Maximum Length	Raw Material
3.51	84	120	S	U	B	-	U	-	105	A	24.5	50	CH
3.409	152	112	S	B	B	-	B	-	62	C	15.0	62	CH
3.123	108	128	S	B	A	U	-	-	20	C	20.0	47	UN
3.304	100	112	S	U	C	-	U	-	28	C	4.0	28	CH
3.478	136	116	S	U	C	-	U	-	39	A	19.5	28	CH
3.225	76	68	S	U	B	B	U	-	20	C	4.0	27	CH
3.98	116	108	S	B	B	-	-	R	23	A	25.0	23	SS
				U	C	B	-	-	17	A			
3.203	124	104	S	B	B	-	U	-	35	A	37.0	50	CH
				U	C	-	U	-	23	C			
3.67	84	108	S	U	B	B	U	-	43	A	19.0	42	CH
3.175	132	108	S	U	C	B	-	-	66	C	102.0	80	CH
3.133	120	108	S	U	B	B	-	-	64	A	93.0	64	RH
3.552	80	120	S	U	C	-	U	-	57	E	47.0	58	QU
3.303	104	108	S	U	B	U	U	-	75	A	16.5	50	CH
3.245	80	96	S	U	C	-	U	-	17	A	8.0	31	CH
3.303	104	108	S	U	A	B	-	-	25	D	1.5	31	CH
				U	A	B	-	-	27	D			
				U	-	U	-	-	-	T			
3.182	124	96	S	B	C	B	-	-	82	A	34.5	64	RH
3.256	84	88	S	-	B	-	-	-	56	A	53.0	72	RH
				-	B	-	U	-	42	C			
3.350	96	88	S	U	A	-	B	-	36	A	44.5	56	RH
				-	A	B	U	-	16	B			
3.267	76	100	S	U	B	U	-	-	46	A	15.5	42	SS
3.103	88	84	S	B	B	B	-	-	103	A	41.5	60	RH
3.499	72	144	S	B	B	-	B	R	62	A	40.5	60	RH
3.326	140	124	S	U	B	-	U	-	32	A	1.0	24	CH
3.294	100	108	S	U	A	B	B	-	12	C	1.5	19	CH
3.12	74	102	S	U	B	U	-	-	19	A	11.5	39	BA
3.238	88	100	S	U	B	B	U	-	82	A	6.5	40	CH

Lot No.	Provenience N	W	L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
3.369	104	96	S	U	C	-	U	-	72	A	16.5	37	CH
3.174	92	100	S	U	C	-	U	-	21	A	38.0	61	LI
3.593	116	164	S	U	A	-	B	-	47	C	12.0	56	SS
3.122	116	104	S	U	C	B	U	-	66	A	19.5	39	CH
3.180	68	80	S	U	C	-	B	-	28	B	19.0	42	CH
3.122	116	104	S	U	C	-	U	-	16	B	7.0	38	CH
3.339	144	80	S	U	C	-	B	-	55	A	34.0	48	QU
3.278	88	120	S	U	C	B	U	-	63	C	13.5	44	CH
				B	B	B	-	-	43	A			
3.155	112	84	S	U	A	U	U	-	19	C	6.0	33	CH
3.258	108	124	S	B	A	-	B	-	11	B	1.5	22	CH
				-	A	B	-	-	13	C			
3.325	96	116	S	U	C	-	U	-	35	A	11.5	34	RH
3.407	144	120	S	B	B	-	B	-	22	C	20.0	41	CH
3.612	52	100	S	U	B	-	U	-	37	C	9.0	43	RH
3.472	128	100	S	U	B	B	-	-	34	A	4.5	30	BA
3.275	114	112	S	U	B	B	-	-	62	A	4.5	24	CH
3.44	84	100	S	U	A	B	-	-	29	A	0.5	13	OB
3.231	120	112	S	B	A	B	B	-	93	A	14.5	49	RH
3.531	152	120	S	U	C	U	U	-	91	A	7.0	30	CH
4.315	84	108	1	-	A	B	-	-	38	A	5.5	42	CH
3.895	132	84	2	-	A	B	B	-	95	A	49.5	69	QU
4.236	100	102	2	-	B	B	-	-	82	C	77.5	83	QU
				-	B	B	-	-	42	C			
4.53	116	108	2	U	B	B	-	-	67	A	88.0	72	QU
4.182	100	84	4	-	A	B	-	-	84	A	31.0	60	RH
4.290	116	95	2	-	A	B	-	-	88	A	16.5	52	RH
4.324	84	108	4	U	C	B	U	-	28	A	14.0	41	CH
4.241	100	102	5	-	C	-	U	-	20	A	10.5	42	SS
				-	C	-	U	-	21	B			
4.53	116	108	2	U	B	-	U	-	23	E	10.0	72	CH
				-	A	B	-	-	22	A			

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
4.267	116	95	1	-	B	U	-	-	13	C	7.5	34	CH
3.902	116	140	1	U	C	B	U	-	25	A	6.5	32	CH
4.40	116	124	2	U	B	-	-	-	27	A	6.0	40	BA
4.322	84	108	3	-	A	B	-	-	26	D	3.0	32	RH
4.268	84	92	1	-	A	U	-	-	22	C	2.0	28	BA
				-	A	B	-	-	13	C			
4.66	116	140	4	U	C	U	-	-	54	E	5.0	52	RH
4.100	100	116	4	-	B	B	-	-	22	A	40.5	76	BA
4.176	100	84	1	-	B	B	-	-	18	C	10.0	44	CH
4.236	100	102	2	-	C	U	-	-	44	C	22.0	48	RH
4.236	100	102	2	-	B	B	-	-	33	C	28.0	52	QU
				B	B	-	B	-	20	C			
4.267	116	95	1	-	C	-	B	-	34	D	15.0	41	BA
				-	B	B	-	-	18	A			
				-	A	-	U	-	14	B			
4.270	84	92	2	U	C	-	U	-	27	A	4.0	25	CH
4.34	71	110	1	U	C	B	-	-	54	A	13.5	50	RH
4.398	84	92	4	-	C	U	-	-	32	C	13.0	36	CH
4.290	116	95	2	U	C	U	-	-	22	A	3.0	34	CH
4.53	116	108	2	-	C	-	U	-	20	C	2.5	24	CH
4.39	116	124	1	-	C	-	U	-	10	C	1.0	21	CH
4.179	100	84	3	U	C	-	U	-	17	A	1.5	20	CH
4.258	83	91	3	U	C	U	U	-	51	C	30.0	55	CH
4.47	76	96	1	U	C	U	U	-	76	A	86.5	74	BA
4.458	85	96	4	U	C	-	U	-	37	C	41.0	56	CH
4.400	85	91	2	U	C	U	-	-	40	B	66.0	59	LI
4.158	78	92	3	U	C	B	B	-	52	C	89.0	68	RH
3.837	79	95	1	U	B	B	U	-	95	A	63.5	65	RH
4.525	84	93	4	U	B	B	-	-	54	A	38.5	67	RH
4.280	85	93	2	U	C	B	-	-	34	E	13.0	47	RH
4.507	82	95	2	U	C	B	B	-	33	B	5.5	29	CH
				-	B	B	-	-	20	A			

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Length Functional Edge	Edge Shape	Weight	Maximum Length	Raw Material
4.80	77	98	1	U	A	B	-	-	17	A	1.5	23	CH
4.690	85	98	2	B	C	B	-	-	22	C	4.0	24	CH
4.63	76	98	3	B	B	-	-	-	70	A	83.0	74	RH
4.596	81	96	3	U	C	U	U	-	45	A	58.0	53	RH
				-	C	-	U	-	27	A			
4.646	82	97	3	U	C	B	-	-	62	A	34.5	60	RH
4.281	82	91	3	U	C	U	-	R	47	A	6.5	39	RH
4.561	80	96	3	U	B	B	-	-	104	A	69.0	66	RH
3.337	79	95	1	U	C	-	U	-	34	A	7.5	35	CH
4.148	75	98	2	U	C	U	-	-	36	A	22.0	50	SS
				-	C	U	-	-	28	C			
4.536	84	94	3	U	B	B	U	-	89	A	20.0	57	QU
3.907	76	96	2	U	B	B	-	-	47	C	87.0	71	CH
4.499	81	95	2	U	C	-	U	-	21	C	7.0	35	CH
				U	B	-	-	-	18	C			
4.556	80	96	2	B	B	B	-	-	25	A	28.5	58	CH
4.588	82	94	4	U	C	-	B	-	16	C	14.5	37	SS
4.401	84	92	5	U	B	U	-	-	51	C	24.5	58	RH
				-	A	B	-	-	37	C			
4.372	81	93	1	B	C	-	-	-	37	A	53.0	59	CH
4.228	82	90	3	U	C	B	B	-	23	E	5.5	30	CH
				U	C	B	B	-	11	B			
4.516	84	93	3	U	C	-	-	-	80	C	66.5	88	LI
4.477	81	94	3	B	B	-	-	-	11	C	7.5	30	RH
4.607	83	95	3	U	B	U	-	-	17	C	2.0	17	CH
4.486	83	94	1	B	C	-	-	-	24	C	11.0	41	BA
4.278	84	91	1	U	C	-	U	-	30	C	11.0	40	CH
4.696	85	98	3	U	C	-	B	-	24	A	3.5	25	CH
				U	C	U	-	-	14	A			
3.837	79	95	1	B	C	-	-	-	50	A	47.0	63	LI
4.618	83	95	4	U	C	-	U	-	18	C	5.0	27	CH
4.458	85	96	4	U	C	U	U	-	23	C	5.5	27	CH

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Length Functional Edge	Edge Shape	Weight	Maximum Length	Raw Material
3.890	78	90	4	U	C	-	U	-	27	E	23.0	45	CH
3.922	78	92	1	U	C	U	-	-	32	A	11.0	35	CH
4.230	82	90	4	U	B	B	-	-	30	E	5.0	30	CH
4.596	81	96	3	-	B	B	-	-	36	C	82.0	76	BA
3.882	78	90	2	-	C	-	B	-	44	C	54.5	71	BA
4.475	82	95	1	-	A	B	-	-	41	A	30.0	60	CH
4.362	80	90	3	U	C	-	-	-	24	C	35.0	62	RH
4.535	84	96	3	U	C	U	-	-	26	C	16.0	38	CH
				-	A	B	-	-	28	A			
4.452	83	96	1	-	A	B	B	-	37	A	6.5	36	CH
4.454	85	96	3	-	C	B	-	-	26	C	15.5	34	CH
4.531	83	96	2	-	C	U	-	-	30	C	26.5	33	RH
4.516	84	93	3	-	C	B	-	-	39	A	9.5	29	CH
4.345	85	93	4	-	C	B	-	-	23	C	4.5	30	CH
				-	C	B	-	-	12	C			
4.511	84	93	2	-	C	U	-	-	18	C	13.0	37	CH
4.93	78	96	1	-	C	U	-	-	21	A	2.5	23	CH
3.890	78	90	4	-	-	U	-	-	-	T	2.0	30	CH
4.531	83	96	2	-	C	B	-	-	35	A	5.5	48	CH
				-	C	B	-	-	20	B			
4.516	84	93	3	-	C	U	-	-	12	B	6.0	28	CH
				-	B	B	U	-	15	C			
4.663	84	96	3	-	B	B	-	-	15	C	2.5	19	CH
4.259	83	91	4	-	A	B	-	-	12	C	2.5	26	CH
4.157	75	99	2	B	B	-	B	-	17	C	1.5	30	CH
4.502	81	95	3	B	B	B	-	-	94	A	64.5	64	RH
3.839	77	91	2	-	A	-	B	-	31	A	54.0	63	QU
4.484	85	92	2	-	A	-	B	-	43	C	67.0	86	RH
				-	A	B	-	-	82	C			
4.115	82	91	2	-	B	U	-	-	57	A	27.0	49	CH
4.373	81	93	2	-	B	U	-	-	26	D	17.0	47	CH
4.358	81	92	1	-	C	B	-	-	64	A	4.0	24	OB

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
4.717	85	99	2	-	A	-	B	-	23	C	9.0	45	CH
3.872	78	95	2	-	B	B	-	-	28	C	18.0	50	CH
4.717	85	99	2	-	A	B	-	-	37	C	11.0	45	CH
4.644	72	99	3	-	A	B	-	-	27	C	5.5	37	CH
				-	-	B	-	-	-	T			
4.499	81	95	2	-	A	U	U	-	37	A	17.0	45	SS
4.486	83	94	1		B	B	-	-	85	A	22.0	44	RH
4.667	84	96	4	U	A	B	-	-	36	A	23.5	36	CH
4.469	81	97	1	-	B	B	-	-	56	A	7.0	32	CH
4.24	79	97	1	-	A	B	-	-	23	C	9.5	36	CH
4.145	78	98	2	-	A	B	-	-	38	A	7.5	33	CH
4.476	82	94	2	-	A	B	-	-	24	E	4.0	27	CH
3.908	76	94	1	-	A	B	-	-	50	A	1.5	25	CH
3.640	72	99	2	U	A	-	U	-	15	A	0.5	14	CH
4.454	85	96	3	-	B	B	-	-	55	A	13.0	40	CH
4.230	82	90	4	-	A	U	-	-	30	C	4.5	39	RH
4.475	82	95	1	-	A	B	-	-	19	C	5.5	31	CH
4.145	78	98	2	-	A	-	B	-	26	A	4.0	26	CH
4.533	84	96	2	-	A	U	-	-	12	C	1.0	20	CH
4.712	84	99	3	-	C	U	U	-	25	A	11.0	33	CH
4.469	81	97	1	-	A	B	B	-	59	A	5.0	28	CH
4.356	82	93	2	-	A	B	-	-	34	A	4.0	33	CH
4.454	85	96	3	-	A	B	-	-	24	C	3.5	43	CH
				-	A	U	-	-	38	C			
4.375	85	95	1	-	A	B	-	-	22	C	3.5	27	CH
4.366	80	90	5	U	B	U	U	-	23	D	4.0	29	QU
4.667	84	96	4	-	A	B	-	-	48	A	4.0	30	CH
4.548	84	95	3	-	B	B	-	-	19	A	13.0	40	CH
4.550	80	92	4	-	A	B	-	-	28	A	1.5	27	CH
3.914	76	93	2	-	B	B	B	-	18	B	3.0	23	CH
4.327	81	91	1	-	A	B	-	-	32	A	6.0	30	RH
4.632	83	94	3	-	A	B	-	-	42	A	6.0	34	CH

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
4.641	82	97	2	-	C	B	-	-	21	C	4.5	30	CH
3.881	76	95	2	-	A	B	-	-	13	C	0.5	15	CH
4.533	84	96	2	-	B	B	-	-	14	C	2.0	22	CH
4.506	83	96	3	-	B	B	U	-	25	A	3.0	26	OB
4.482	84	95	2	-	C	U	U	-	9	C	3.5	23	CH
3.635	74	100	1	-	C	-	U	-	18	A	2.5	22	CH
				-	C	-	U	-	8	B			
3.758	78	89	2	-	B	U	-	-	15	C	1.0	24	CH
4.256	117	96	3	B	B	B	-	R	56	C	72.0	67	SS
4.440	114	96	1	U	B	B	-	-	60	E	34.0	63	RH
4.455	117	98	2	U	C	U	U	-	26	B	134.0	92	RH
4.44	108	96	1	U	B	B	-	-	41	A	36.0	51	RH
4.594	108	93	3	U	B	B	-	-	41	C	14.5	47	RH
4.173	117	95	1	U	C	U	U	-	20	C	4.0	26	CH
				U	C	-	U	-	10	B			
				-	B	B	-	-	15	C			
				-	-	B	-	-	-	T			
4.434	107	95	3	U	C	U	-	-	21	A	5.0	27	CH
				U	C	B	-	-	14	C			
				U	C	B	-	-	17	C			
3.786	109	98	1	B	B	B	-	-	20	A	1.5	18	CH
4.328	116	100	2	U	C	-	B	-	28	C	8.5	47	RH
				-	A	U	-	-	54	A			
4.389	113	96	1	B	B	-	-	-	16	A	4.0	32	BA
4.214	108	95	1	U	C	U	U	-	30	C	9.0	38	CH
4.26	115	99	1	U	B	U	-	-	33	C	7.0	41	CH
				-	B	U	-	-	15	B			
4.256	117	96	3	U	C	-	B	-	22	C	6.5	29	CH
4.425	110	97	3	U	C	U	-	-	15	C	12.0	35	CH
				-	C	-	U	-	12	B			

Lot No.	Provenience N	W	L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
4.583	112	95	3	-	B	-	B	-	29	A	6.5	31	BA
				-	C	-	B	-	21	B			
				-	-	B	-	-	-	T			
4.705	118	97	2	U	C	B	B	-	27	C	14.5	33	CH
3.894	108	97	1	B	B	B	-	-	38	A	6.5	32	CH
4.331	114	98	3	U	C	-	B	-	23	C	7.0	39	CH
3.836	114	99	2	U	C	B	-	R	68	C	44.0	69	SS
3.989	107	97	3	U	C	B	-	R	31	A	24.0	46	SS
4.685	112	97	4	U	C	U	-	-	13	B	2.5	21	CH
4.504	107	95	4	U	C	U	-	-	23	A	36.5	47	CH
3.818	112	98	1	U	C	-	U	-	31	A	9.5	29	CH
4.634	110	95	4	U	C	-	-	-	21	C	5.5	35	CH
4.188	117	96	1	-	B	B	-	-	33	C	48.5	57	RH
4.82	116	101	1	-	B	B	-	-	45	A	10.0	52	CH
4.569	115	95	2	-	A	B	-	-	40	A	10.5	42	QU
4.544	110	96	3	-	A	B	U	-	52	A	15.0	43	BA
4.276	107	95	1	-	C	U	U	-	17	B	9.0	35	CH
				-	A	B	-	-	11	C			
4.256	117	96	3	-	B	U	-	-	25	C	9.5	38	CH
4.325	116	100	1	-	C	U	-	-	17	C	3.5	26	CH
				-	B	B	-	-	12	A			
4.582	111	96	3	-	A	B	-	-	39	A	7.5	42	BA
4.457	118	98	2	-	B	B	-	-	32	A	9.0	34	CH
4.334	114	100	3	-	B	U	B	-	18	C	9.5	44	CH
				-	C	-	U	-	9	C			
4.457	118	98	2	-	B	B	-	-	32	A	9.0	34	CH
4.592	108	93	2	-	C	B	B	-	26	E	4.0	38	CH
3.960	111	99	3	-	A	B	-	-	103	A	103.5	71	BA
4.216	114	98	2	-	C	U	-	-	37	E	64.0	62	RH
4.339	118	97	1	B	B	-	B	-	43	C	53.0	61	RH
				U	A	-	-	-	73	A			

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
4.256	117	96	3	-	B	B	-	-	43	A	38.0	67	QU
				-	B	B	-	-	56	C			
4.331	114	98	3	-	A	B	-	-	53	A	42.0	53	CH
4.328	116	100	2	-	B	-	B	-	42	A	25.0	51	CH
3.809	111	98	1	-	A	B	-	-	15	C	11.0	37	CH
3.986	107	97	2	-	B	-	U	-	26	A	4.0	31	CH
4.389	113	96	1	-	B	U	-	-	22	C	3.0	34	CH
4.581	115	97	5	-	A	B	-	-	36	A	10.0	37	QU
4.411	113	97	1	-	B	B	-	-	30	A	16.0	43	CH
4.336	114	100	4	-	A	B	-	-	70	E	10.0	43	CH
4.299	117	100	1	-	A	-	B	-	39	A	4.5	34	QU
4.276	1[illegible]	95	1	-	C	U	U	-	17	B	9.0	35	CH
				-	A	B	-	-	11	C			
4.581	115	97	5	-	A	B	-	-	21	A	6.0	41	CH
				-	A	B	-	-	19	C			
4.581	115	97	5	-	A	B	-	-	29	A	8.5	40	CH
3.973	106	96	1	-	A	B	-	-	55	A	4.0	29	CH
4.435	107	95	3	-	B	B	-	-	32	A	10.5	32	CH
4.154	117	99	1	-	B	B	-	-	12	C	11.0	36	RH
4.256	117	96	3	-	A	B	-	-	32	A	9.0	30	CH
3.998	110	98	3	-	A	B	-	-	38	D	6.0	36	BA
4.411	113	97	1	-	A	B	-	-	33	C	16.0	37	RH
				-	B	B	-	-	38	A			
4.141	106	96	4	-	A	-	B	-	45	A	7.0	39	RH
4.109	108	96	5	-	A	B	-	-	40	E	9.5	49	CH
4.216	114	98	2	-	A	B	-	-	29	A	2.0	27	CH
4.421	110	97	1	-	A	B	-	-	45	A	5.0	39	CH
4.351	108	94	2	U	C	-	U	-	14	B	3.0	25	CH
				U	C	-	U	-	9	B			
4.233	115	96	2	-	B	B	-	-	39	A	4.5	29	CH
4.590	112	95	5	-	B	B	-	-	16	C	8.0	31	CH

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
3.997	113	100	4	-	A	B	-	-	23	C	2.5	33	CH
				-	A	B	-	-	26	C			
4.350	116	98	4	-	A	B	-	-	54	A	4.5	42	CH
4.445	108	94	4	-	A	B	-	-	33	A	4.5	30	RH
3.807	112	99	2	-	B	B	-	-	8	C	0.5	12	CH
3.769	110	99	1	-	B	B	B	-	38	A	2.5	21	CH
4.389	113	96	1	-	A	B	-	-	60	A	5.5	45	QU
4.435	107	95	3	-	A	B	U	-	64	A	3.0	40	CH
4.682	111	96	4	-	B	B	U	-	30	A	20.0	22	OB
4.256	117	96	3	-	B	-	U	-	20	A	5.0	39	CH
4.440	114	96	1	-	B	U	-	-	15	C	2.0	24	CH
4.468	89	104	3	U	B	B	-	-	72	A	16.0	38	RH
4.108	88	106	2	U	C	U	U	-	24	A	9.0	36	QU
				U	C	U	U	-	19	A			
4.129	88	106	3	-	C	B	U	-	26	C	18.0	41	CH
4.459	88	104	3	-	A	B	-	-	25	C	7.0	34	CH
3.884	129	91	2	B	C	-	-	R	45	A	74.0	79	SS
3.624	110	114	1	U	B	B	-	-	37	C	15.0	45	CH
				-	A	B	-	-	31	A			
3.659	136	111	3	-	A	B	-	-	36	A	8.5	32	CH
3.700	86	78	3	-	A	B	-	-	64	A	1.5	24	CH
3.792	87	78	5	-	A	B	-	-	49	A	2.0	27	CH

EDGE-MODIFIED CORES

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Length Functional Edge	Edge Shape	Weight	Maximum Length	Raw Material
Bifacial Cores													
3.547	144	88	S	-	C	-	B	-	78	A	203.5	96	CH
3.571	108	112	S	U	C	-	U	R	60	C	32.0	57	CH
				U	C	-	U	-	70	A			
3.294	100	108	S	-	B	-	B	-	42	A	17.0	41	BA
3.404	128	64	S	B	C	B	B	-	56	A	72.5	62	RH
3.239	124	88	S	B	B	B	B	-	84	A	46.0	53	RH
3.565	148	148	S	-	C	B	U	-	35	C	202.0	97	CH
3.332	132	92	S	-	C	U	-	-	60	A	9.0	33	CH
3.168	128	112	S	-	B	B	B	-	82	A	11.5	36	CH
4.628	83	97	2	-	C	-	B	-	145	A	251.0	84	RH
4.631	83	97	3	-	C	-	B	-	57	C	362.5	96	RH
4.626	82	95	3	U	C	-	-	R	76	A	85.5	65	RH
4.281	82	91	3	-	C	U	-	R	88	A	51.5	75	CH
				-	B	B	-	-	30	A			
4.585	82	96	3	-	C	B	U	R	74	E	32.0	46	SS
4.14	77	97	2	U	C	B	-	-	54	A	11.5	35	QU
4.395	83	93	2	-	B	B	B	-	77	A	146.0	75	RH
4.219	83	92	1	-	B	B	-	-	79	A	34.0	55	CH
4.489	83	94	2	-	B	B	-	-	61	A	80.0	76	CH
3.909	77	95	2	-	B	B	-	-	44	C	136.5	86	RH
4.365	80	93	2	B	B	B	B	-	173	A	76.0	71	RH
4.610	116	97	3	-	B	-	B	-	82	A	18.0	42	CH
4.440	114	96	1	-	B	B	-	-	79	A	75.5	58	RH
4.501	112	96	1	-	C	B	U	-	116	A	144.5	67	LI
4.266	88	105	3	-	C	-	B	-	85	A	285.0	86	RH

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
4.92	100	116	2	-	C	B	-	-	53	A	70.0	65	CH
				-	C	B	-	-	64	A			
4.235	100	102	1	-	C	B	-	-	156	E	40.0	67	RH
Edge-modified Nodules													
3.611	60	52	S	U	B	-	B	-	78	A	62.0	84	RH
3.68	120	124	S	U	C	-	B	-	44	C	132.0	66	RH
3.590	100	44	S	-	B	B	B	-	51	A	17.0	64	RH
3.381	146	130	S	U	C	-	U	-	66	A	87.5	87	RH
3.109	112	120	S	-	B	B	-	-	53	C	92.5	72	RH
3.172	128	96	S	-	A	B	-	-	37	C	174.5	98	RH
3.611	60	52	S	U	C	-	B	-	50	C	71.5	50	RH
3.171	124	100	S	B	B	-	B	-	58	A	118.5	73	RH
3.498	76	76	S	B	B	-	B	-	48	C	85.5	68	RH
3.605	52	84	S	B	A	B	B	-	28	C	45.0	56	RH
3.599	132	156	S	-	B	-	B	-	27	B	54.0	57	RH
				-	B	B	-	-	56	A			
3.389	84	78	S	-	B	B	-	-	31	C	40.0	61	RH
3.532	64	80	S	B	B	B	-	-	81	A	56.5	70	RH
3.238	88	100	S	U	C	-	U	-	54	A	67.0	63	RH
3.262	104	132	S	-	C	-	B	-	81	C	646.0	138	RH
				-	C	-	U	-	53	C			
3.369	104	96	S	B	C	B	B	-	78	C	544.0	159	RH
				B	B	B	-	-	103	A			
3.334	144	108	S	B	C	-	B	-	284	D	1024.0	287	RH
3.168	128	112	S	U	B	-	B	-	67	C	67.0	147	RH
3.70	100	88	S	B	B	-	B	-	88	A	96.5	92	RH
3.172	128	96	S	U	B	B	B	-	53	C	87.5	98	RH
				-	C	B	-	-	35	C			
3.70	100	88	S	-	C	-	B	-	83	C	130.5	87	RH
				-	C	B	B	-	56	C			

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Length Functional Edge	Edge Shape	Weight	Maximum [illegible]	Raw Material
3.247	104	104	S	-	A	B	-	-	54	C	207.0	101	RH
3.253	122	98	S	-	C	B	-	-	32	A	321.0	102	RH
3.607	68	60	S	B	B	B	-	-	128	A	229.0	107	RH
3.507	148	100	S	B	B	-	B	-	73	A	150.0	81	BA
3.234	68	96	S	U	B	-	B	R	62	A	205.5	143	SS
3.196	124	116	S	-	B	B	-	-	53	A	701.0	134	SS
3.606	52	68	S	U	A	-	U	-	39	A	45.0	39	RH
				U	A	U	-	-	13	A			
3.394	136	92	S	U	B	B	-	-	32	A	51.5	64	LI
3.569	84	168	S	U	C	U	-	-	10	C	21.0	67	CH
3.606	52	68	S	-	C	B	B	-	46	A	6.5	77	CH
3.597	84	144	S	U	C	-	U	-	34	B	39.5	63	CH
3.114	120	120	S	-	A	B	-	-	42	A	11.0	49	QU
3.343	128	120	S	B	B	-	B	-	28	A	56.0	59	CH
3.369	104	96	S	B	A	B	-	-	38	A	35.0	56	SS
3.253	122	98	S	B	B	B	-	-	52	A	10.0	49	LI
4.728	144	128	S	U	B	B	-	R	53	E	13.5	48	SS
3.455	128	88	S	U	B	U	B	-	18	C	14.0	37	CH
3.590	100	44	S	B	B	B	-	-	38	A	6.5	31	CH
3.367	140	96	S	U	B	U	U	-	29	C	6.5	37	CH
3.137	108	88	S	U	A	U	-	R	76	A	29.0	67	RH
4.90	100	116	1	-	B	B	-	-	58	C	99.0	81	RH
4.35	71	110	2	U	C	-	U	-	68	A	222.0	112	RH
4.253	68	81	1	-	C	-	B	-	43	C	80.0	60	RH
4.90	100	116	1	-	B	B	-	-	44	C	75.0	72	RH
4.39	116	124	1	-	B	U	-	-	66	A	82.0	68	RH
4.315	84	108	1	B	B	B	-	-	35	C	22.5	50	RH
4.238	100	102	3	B	A	U	-	-	81	A	66.5	76	RH
4.537	80	97	3	B	B	-	B	-	45	C	182.5	94	RH
				B	C	-	-	-	80	A			
4.472	81	94	2	U	C	-	U	-	66	A	58.5	76	RH

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
4.696	85	98	3	U	B	B	-	-	40	C	51.5	65	RH
				-	A	-	B	-	23	C			
4.230	82	90	4	-	B	B	-	-	27	C	41.0	50	RH
				-	B	B	-	-	21	C			
4.616	83	96	3	B	A	B	-	-	81	D	172.5	110	RH
4.115	82	91	2	U	B	B	-	-	73	C	68.0	75	RH
				B	C	-	-	-	72	A			
4.137	79	98	2	B	B	-	B	-	55	E	40.5	71	RH
3.907	76	96	2	-	C	U	-	-	26	C	16.0	39	CH
4.663	84	96	3	-	C	-	U	-	36	C	104.0	90	RH
4.546	80	92	3	B	A	-	B	-	18	C	27.5	61	BA
4.516	84	93	3	U	B	B	-	B	25	C	48.0	94	SS
4.418	81	94	1	B	C	B	-	-	53	A	159.5	82	LI
4.628	83	97	2	-	C	B	-	B	31	C	53.0	60	SS
4.397	114	100	3	B	B	B	-	-	58	C	219.0	84	RH
				B	C	-	-	-	47	A			
4.256	117	96	3	-	B	B	-	-	65	C	254.0	105	RH
4.214	108	95	1	U	B	B	-	-	96	C	92.5	104	RH
				B	B	B	-	-	36	A			
4.3	106	97	2	B	C	B	B	-	75	A	138.0	74	RH
4.256	117	96	3	-	B	B	-	-	77	A	302.0	118	RH
4.256	117	96	3	B	B	-	B	-	64	C	124.0	112	RH
4.587	112	95	4	-	B	U	-	-	48	C	37.0	63	RH
4.256	117	96	3	U	C	B	-	-	66	C	103.5	118	RH
4.107	108	96	4	U	B	B	U	-	31	A	9.5	52	RH
4.435	107	95	3	B	A	-	B	-	24	C	76.0	92	SS
4.393	111	97	1	-	A	B	-	B	123	A	29.0	66	SS
3.965	108	98	3	U	A	B	-	-	35	E	107.0	96	RH
3.723	111	114	2	B	A	B	-	-	37	A	37.0	52.5	BA

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
Single Platform Cores													
3.308	96	100	S	U	C	-	U	-	60	A	38.5	51	CH
3.472	128	100	S	U	C	-	U	-	132	A	189.0	80	CH
3.273	116	96	S	U	C	U	U	-	182	A	181.5	95	CH
3.456	152	128	S	U	C	U	U	-	160	A	471.5	115	RH
3.291	88	112	S	U	C	B	B	-	158	A	672.5	120	RH
3.522	132	72	S	-	C	B	B	-	72	A	38.5	57	SS
3.203	124	104	S	U	C	B	-	-	108	A	44.5	53	LI
3.566	148	148	S	U	C	B	B	-	140	A	40.5	60	RH
3.113	120	120	S	U	C	B	U	-	113	E	32.5	54	CH
3.529	140	116	S	U	C	B	-	-	72	A	20.0	43	CH
3.466	128	104	S	U	C	B	-	R	85	A	424.0	102	SS
3.541	80	108	S	U	C	-	B	-	71	A	355.0	94	RH
3.176	132	108	S	U	C	-	U	R	58	C	293.0	91	RH
				-	C	-	B	-	57	C			
4.477	81	94	3	U	C	U	-	-	107	A	392.0	116	RH
4.618	83	95	4	-	B	-	B	-	142	A	230.0	95	RH
3.879	76	95	1	U	C	U	U	-	54	C	126.0	66	RH
4.65	76	97	1	U	C	U	U	-	33	B	46.0	65	CH
4.420	83	93	4	-	B	-	U	-	72	E	44.0	56	CH
4.573	82	94	3	U	A	B	-	-	47	A	9.0	34	CH
4.391	83	93	1	-	C	-	U	-	57	A	100.0	66	CH
4.392	83	93	1	-	B	-	B	-	23	A	76.5	62	RH
3.634	74	98	2	-	C	-	U	-	47	C	270.0	98	RH
3.658	122	95	2	U	B	-	B	-	61	A	173.0	82	RH
				U	B	B	U	-	64	A			
4.256	117	96	3	-	C	U	-	-	81	A	217.0	99	QU
4.299	117	100	1	U	C	U	U	-	111	A	295.0	84	RH
4.615	116	97	4	U	C	-	B	-	100	A	475.0	125	SS
4.256	117	96	3	-	C	-	U	-	96	A	208.0	86	RH
4.167	88	107	4	U	C	-	U	-	92	A	169.0	84	SS

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
4.130	88	106	3	U	C	-	U	-	60	D	219.5	115	RH
3.745	131	120	1	U	C	U	U	-	27	E	9.5	38	CH
				-	C	U	U	-	19	A			
Multiple Platform Cores													
3.216	68	88	S	U	C	-	U	-	52	A	78.0	61	RH
3.41	92	80	S	-	B	B	B	-	99	E	24.0	48	RH
3.371	88	72	S	U	C	-	U	-	26	C	12.0	43	CH
3.603	132	90	S	B	B	B	B	-	56	A	15.5	37	CH
3.519	112	132	S	-	B	B	-	-	50	E	11.5	43	CH
4.381	82	93	4	B	B	-	-	-	31	A	242.5	96	RH
4.379	82	93	3	U	C	B	U	-	59	A	84.0	55	CH
3.914	76	93	2	-	C	-	B	-	24	C	134.0	84	RH
4.548	84	95	3	U	C	U	U	B	81	A	68.0	66	CH
4.284	75	95	1	-	C	U	B	-	79	E	65.0	52	CH
4.380	85	95	4	-	C	U	U	-	66	E	21.5	42	CH
4.573	82	94	3	B	C	-	B	-	70	A	37.5	56	RH
4.650	84	98	1	-	C	U	U	-	63	A	97.5	65	QU
4.694	85	97	3	-	B	B	-	-	34	A	63.0	64	BA
4.172	79	97	2	U	C	-	U	-	63	A	77.5	70	CH
				-	C	B	U	-	47	A			
4.632	83	94	3	-	B	B	-	-	43	E	9.0	32	CH
4.713	85	99	1	-	B	B	B	-	104	A	10.5	36	CH
4.635	74	100	1	U	C	U	B	-	21	C	11.0	34	CH
				U	C	B	U	-	25	A			
4.589	108	93	1	-	C	B	-	-	26	A	17.0	43	CH
4.256	117	96	3	-	B	-	B	-	19	B	11.0	31	CH
				-	B	B	-	-	15	D			
4.256	117	96	3	-	C	B	U	-	39	C	237.0	105	RH
4.162	116	99	1	-	C	U	-	-	46	E	49.0	50	CH

Lot No.	Provenience N	W	L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Length Functional Edge	Edge Shape	Weight	Maximum Length	Raw Material
4.325	116	100	1	-	C	U	U	-	44	A	41.5	48	LI
4.669	117	97	4	B	B	-	-	B	61	A	62.0	57	CH
4.461	113	95	4	-	A	B	-	-	48	A	8.5	31	CH
4.471	89	104	4	-	B	-	B	-	23	C	68.5	51	CH
4.443	88	104	1	-	B	B	-	-	33	A	13.0	33	CH

SHAPED UNIFACES AND BIFACES

Lot No.	Provenience N	Provenience E	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Length Functional Edge	Edge Shape	Weight	Maximum Length	Raw Material
Miscellaneous Unifaces													
3.568	100	156	S	U	C	B	U	-	38	A	12.0	36	CH
				U	C	B	U	-	36	A			
3.275	114	112	S	U	C	U	U	F	29	C	22.5	46	BA
				U	-	-	P	-	-	T			
				U	C	B	U	-	35	C			
4.171	79	97	2	U	C	-	U	-	34	F	12.5	42	CH
				-	C	-	U	-	29	C			
4.588	82	94	4	U	C	U	U	-	108	A	18.5	48	LI
3.982	111	98	3	U	A	F	U	-	38	B	8.5	55	CH
				U	A	U	U	-	15	C			
Miscellaneous Bifaces													
3.483	136	124	S	B	C	U	-	-	144	A	65.0	93	RH
3.330	96	112	S	B	C	U	U	-	48	C	34.5	53	BA
				U	C	B	U	-	39	A			
				B	C	B	U	-	46	A			
3.31	74	99	1	B	C	B	-	-	86	C	24.5	90	CH
				B	C	-	-	-	87	C			
				-	-	-	P	-	-	T			
4.580	115	97	4	U	C	U	-	-	55	C	25.0	68	CH
				U	C	U	U	-	56	C			
				B	B	B	-	-	17	A			
3.24	121	95	1	B	A	B	-	-	17	C	3.0	24	CH
				B	A	P	-	-	20	C			

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
Projectile Points													
3.386	76	108	S	B	B	-	-	-	27	A	4.0	30	CH
				B	C	-	-	-	29	A			
4.103	100	116	5	B	B	-	-	-	44	A	4.5	44	QU
				B	B	-	-	-	44	A			
4.697	85	98	3	B	B	-	-	-	38	A	4.0	40	CH
				B	B	-	-	-	40	A			
3.975	114	99	4	B	B	-	-	-	29	C	4.0	31	CH
				B	C	-	-	-	31	C			
3.56	72	100	S	B	C	-	-	-	36	A	3.5	36	QU
				B	C	-	-	-	35	A			
				-	-	-	-	R	-	T			
4.665	84	96	3	B	B	B	B	-	36	A	3.5	37	CH
				B	B	B	B	-	40	A			
4.374	81	93	2	B	B	-	-	-	21	A	1.5	22	CH
				B	B	-	-	-	28	A			
3.813	114	100	1	B	C	B	-	-	60	A	5.5	57	CH
				B	C	B	-	-	56	A			
4.718	85	99	2	B	C	-	-	-	43	A	5.0	43	QU
				B	C	-	-	-	42	A			
4.169	79	97	2	B	B	U	-	-	38	A	3.0	36	CH
				B	C	-	-	-	36	A			
4.135	76	93	4	B	C	-	-	-	27	A	3.0	36	CH
				B	C	-	-	-	26	A			
3.829	BHT A			B	C	-	-	-	33	A	5.0	49	QU
				R	C	-	-	-	35	A			
4.286	75	95	1	B	B	-	-	-	27	A	2.5	27	RH
				B	B	-	-	-	28	A			
3.436	128	108	S	B	B	-	-	-	20	D	1.5	27	CH
				R	B	-	-	-	16	D			
4.490	83	94	2	B	B	B	-	-	64	A	1.5	24	OB

Lot No.	Provenience N	Provenience W	Provenience L	Marginal Retouch	Edge Angle	Feather Scars	Step Scars	Abrasion	Functional Edge Length	Edge Shape	Weight	Maximum Length	Raw Material
3.900	108	97	2	B	B	B	-	-	27	A	3.0	35	CH
				B	B	B	-	-	28	A			
4.163	116	99	1	B	C	-	U	-	18	C	4.0	35	CH
				B	C	-	U	-	23	C			
4.186	89	105	1	B	B	B	B	-	42	D	4.5	45	CH
				B	B	B	B	-	46	D			
3.17	93	107	S	B	C	B	-	-	28	A	4.0	37	CH
				B	C	B	-	-	27	A			

APPENDIX F: Proveniences in Units 1 and 2 by Component

This appendix summarizes the arbitrary excavation levels, by minimum horizontal provenience unit in Units 1 and 2, assigned to each component.

Unit 1

	Component					Component			
Grid Square	3/4	3	2	1	Grid Square	3/4	3	2	1
N72/W99(W½)		1*	2,3		N78/W90		1	2,3,4	
N73/W99(W½)		1	2,3		N78/W89		1,2		
N74/W101(N½)			1,2		N78/W88		1,2		
NN74/W100(N½)		1	2,3		N79/W98		1	2	
N74/W98(N½)		1	2,3		N79/W97		1	2	
N74/W97(N½)		1	2		N79/W96		1	2	
N74/W96(N½)		1	2		N79/W95		1	2	
N75/W99		1	2,3		N79/W94		1,2	3	
N75/W98		1,2	3		N79/W93		1,2	3,4	
N75/W97		1,2	3		N79/W92		1	2,3	
N75/W96		1,2	3		N79/W91		1	2,3	
N75/W95		1			N79/W90		1	2,3	
N76/W99(W½)		1,2	3		N79/W89		1,2	3,4	
N76/W99(E½)		1	2		N80/W97		1	2,3	
N76/W98		1,2	3		N80/W96		1	2,3	
N76/W97		1,2	3		N80/W95		1	2,3	
N76/W96		1,2	3		N80/W94		1	2,3	
N76/W95		1	2,3		N80/W93		1	2,3	
N76/W94		1	2,3		N80/W92		1,2	3,4	
N76/W93			1,2,3		N80/W91		1	2,3	
N76/W92			1,2		N80/W90		1,2	3,4	
N76/W91		1,2	3		N80/W89		1	2,3	
N77/W99(W½)		1,2	3,4		N81/W97		1	2,3	
N77/W99(E½)		1	2		N81/W96		1	2,3	
N77/W98		1	2		N81/W95		1	2,3	
N77/W97		1,2	3		N81/W94		1	2,3	
N77/W96		1,2	3		N81/W93		1	2,3	
N77/W95		1	2		N81/W92		1	2,3	
N77/W94		1	2		N81/W91		1	2,3	
N77/W93			1,2,3		N81/W90		1,2	3	
N77/W92			1,2		N82/W97		1,2	3,4	
N77/W91		1,2	3		N82/W96		1	2,3	
N78/W98		1	2		N82/W95		1	2,3	
N78/W97		1	2		N82/W94		1,2	3,4	
N78/W96		1	2		N82/W93		1,2	3,4	
N78/W95		1	2		N82/W92		1	2,3	
N78/W94		1,2	3		N82/W91		1	2,3	
N78/W93		1,2	3,4		N82/W90		1,2	3	
N78/W92		1	2,3		N83/W97		1,2	3,4	
N78/W91		1	2,3		N83/W96		1,2	3,4	

*indicates level number.

Unit 1, continued

Grid Square	Component 3/4	3	2	1	Grid Square	Component 3/4	3	2	1
N83/W95		1,2	3,4		N84/W92		1	2,3	
N83/W94		1	2,3		N84/W91		1	2,3	
N83/W93		1,2	3,4		N85/W99		1	2,3	
N83/W92		1,2	3,4		N85/W98		1	2,3	
N83/W91		1,2	3,4		N85/W97		1,2	3,4	
N84/W99		1	2,3		N85/W96		1,2	3,4	
N84/W98(W½)		1	2,3		N85/W95		1,2	3,4	
N84/W97		1,2	3,4		N85/W94		1,2	3,4	
N84/W96		1,2	3,4		N85/W93		1,2	3,4	
N84/W95		1,2	3,4		N85/W92		1	2,3	
N84/W94		1,2	3,4		N85/W91		1	2,3	
N84/W93		1,2	3,4						

Unit 2

Grid Square	Component 3/4	3	2	1	Grid Square	Component 3/4	3	2	1
N106/W97	1,2		3	4	N112/W98	1		2,3	4
N106/W96	1,2		3	4	N112/W97	1		2,3	4
N107/W97	1,2		3,4	5,6	N112/W96	1		2,3	4
N107/W96	1,2,3		4	5	N112/W95	1,2		3,4	5
N107/W95	1		2,3	4,5	N113/W100	1		2,3	4
N108/W100			1,2	3,4,5	N113/W99			1,2,3	4
N108/W98	1,2		3	4,5	N113/W98			1,2	3,4
N108/W97	1,2		3	4,5	N113/W97	1		2	3,4
N108/W96	1,2		3,4	5	N113/W96			1,2	3,4
N108/W95	1,2		3	4,5	N113/W95	1		2,3	4,5
N108/W94	1,2		3	4,5	N114/W100	1		2,3	4,5
N108/W93	1		2	3,4	N114/W99			1,2	3,4,5
N109/W98	1,2		3	4,5	N114/W98			1,2,3	4
N109/W97	1,2		3	4,5	N114/W97			1,2	3
N109/W96	1,2		3,4	5,6	N114/W96			1,2	3
N109/W94	1		2,3,4	5,6	N114/W95	1		2,3	4
N110/W99	1,2		3	4	N115/W101	1		2	3
N110/W98	1		2,3	4	N115/W100	1		2	3
N110/W97	1,2		3	4,5	N115/W99			1	2,3
N110/W96	1		2,3	4,5	N115/W98	1,2		3,4	5
N110/W95	1		2,3	4	N115/W97	1,2		3,4	5
N111/W99	1		2,3	4	N115/W96	1,2		3,4	5
N111/W98	1		2,3,4		N115/W95			1,2,3	4
N111/W97	1		2,3	4	N116/W101	1		2	
N111/W96	1		2,3	4	N116/W100			1,2	

Unit 2, continued

	Component					Component			
Grid Square	3/4	3	2	1	Grid Square	3/4	3	2	1
N111/W95	1,2		3	4	N116/W99			1,2	
N112/W99	1		2,3	4	N116/W98	1,2		3	4
N116/W97	1,2		3	4,5	N118/W97			1,2	3
N116/W96	1,2		3	4,5	N118/W96	1		2	3,4
N116/W95			1,2	3,4	N118/W95	1		2,3	4
N117/W100			1		N119/W95	1		2	3
N117/W99			1		N120/W95			1	2,3,4
N117/W98			1,2		N120/W94			1,2	3-8
N117/W97	1		2,3	4,5	N121/W95			1	2,3,4
N117/W96	1		2,3	4	N121/W94			1,2,3	4-8
N117/W96	1		2,3	4	N122/W95(E½)			1,2	
N118/W99			1		N122/W94			1,2	
N118/W98			1,2		N123/W94(S½)			1,2	

APPENDIX G: Artifact Tallies by Minimum Provenience Unit

This appendix lists, by minimum provenience unit, the numbers of artifacts recovered from Site 32. Provenience units are grouped into (1) surface collection, (2) Unit 1 excavations, (3) Unit 2 excavations, (4) Unit 3 excavations, (5) sampling excavations, (6) Phase I excavations, (7) surface feature excavations, and (8) miscellaneous proveniences. Within each group, proveniences are arranged by increasing north and west grid coordinates.

Provenience (grid coordinate is at southeast corner of collection unit):

S = surface collection
L = arbitrary excavation level (10 cm)

A = unmodified flakes, chips and angular fragments

B = edge-modified flakes, chips and angular fragments

C = unmodified cores

D = edge-modified cores

E = shaped bifaces and unifaces

F = ground and pecked stone tools

G = battered stone tools

H = ground, pecked or battered tool fragments

I = ceramics

J = historic materials

Surface Collection:

Provenience	A	B	C	D	E	F	G	H	I	J	Provenience	A	B	C	D	E	F	G	H	I	J
N52/W68, S	8	2	4	2	-	-	-	-	-	-	N76/W68, S	5	1	2	-	-	-	1	-	-	-
N52/W84, S	3	1	1	1	-	-	-	-	-	-	N76/W72, S	2	-	1	-	-	-	-	-	-	-
N52/W100, S	6	2	2	-	-	-	-	-	-	-	N76/W76, S	2	-	-	1	-	-	-	-	-	-
N60/W40, S	-	2	-	-	-	-	2	-	-	-	N76/W78, S	4	-	3	-	-	-	-	-	-	-
N60/W52, S	2	2	-	2	-	-	-	-	-	-	N76/W80, S	13	-	-	-	-	-	-	-	-	-
N60/W76, S	-	-	1	-	-	-	-	-	-	-	N76/W84, S	28	-	2	-	-	-		-	-	-
N60/W80, S	-	-	1	-	-	-	-	-	-	-	N76/W88, S	30	-	3	-	-	-	-	1	-	-
N60/W84, S	1	-	2	-	-	-	-	-	-	-	N76/W92, S	17	-	-	-	-	-	-	-	-	-
N60/W88, S	1	-	1	-	-	-	-	-	-	-	N76/W96, S	4	-	2	-	-	-	-	-	-	-
N60/W92, S	1	-	2	-	-	-	-	-	-	-	N76/W100, S	18	3	2	-	-	-	-	-	-	-
N60/W96, S	1	-	-	-	-	-	-	-	-	-	N76/W104, S	44	3	2	-	-	-	1	-	-	-
N60/W100, S	7	1	1	-	1	-	-	-	-	-	N76/W108, S	-	-	-	-	1	-	-	-	-	-
N60/W104, S	12	2	3	-	-	-	-	-	-	-	N78/W76, S	5	-	-	-	-	-	-	-	-	-
N64/W76, S	5	-	-	-	-	-	-	-	-	-	N78/W78, S	8	-	-	-	-	-	-	-	-	-
N64/W80, S	2	2	1	1	-	-	-	-	-	-	N80/W68, S	-	-	-	-	-	-	-	-	-	-
N64/W84, S	4	2	1	-	-	-	-	-	-	-	N80/W72, S	6	-	3	-	-	-	-	-	-	-
N64/W88, S	13	3	2	-	-	-	-	-	-	1	N80/W76, S	5	-	1	-	-	-	-	-	-	-
N64/W92, S	9	1	2	-	-	-	-	-	-	-	N80/W80, S	6	1	1	-	-	-	-	-	-	-
N64/W96, S	3	-	-	-	-	-	-	-	-	-	N80/W84, S	25	3	4	-	-	-	-	-	-	-
N64/W100, S	10	-	2	-	-	-	-	-	-	-	N80/W88, S	28	-	6	-	-	-	-	-	-	-
N64/W104, S	7	1	1	-	-	-	1	-	-	1	N80/W92, S	9	-	1	-	-	-	-	-	-	-
N68/W60, S	-	-	2	1	-	-	1	-	-	-	N80/W96, S	7	1	-	-	-	-	-	-	-	-
N68/W68, S	-	-	-	-	-	-	-	-	-	-	N80/W100, S	-	-	1	-	-	-	-	-	-	-
N68/W72, S	1	-	-	-	-	-	-	-	-	-	N80/W104, S	5	-	-	-	-	-	-	-	-	-
N68/W76, S	1	-	-	-	-	-	1	-	-	-	N80/W108, S	34	-	2	2	-	-	-	-	-	-
N68/W80, S	2	2	-	-	-	-	-	-	1	-	N80/W112, S	7	-	-	-	-	1	-	-	-	-
N68/W84, S	10	-	1	-	-	-	-	-	-	8	N80/W116, S	7	1	3	-	-	-	1	-	-	-
N68/W88, S	18	-	4	1	-	-	-	-	-	-	N80/W120, S	17	1	6	-	-	-	-	-	-	-
N68/W92, S	3	1	2	-	-	-	-	-	-	-	N84/W68, S	2	-	1	-	-	-	-	-		-
N68/W96, S	10	-	3	1	-	-	-	-	-	-	N84/W72, S	2	-	-	-	-	-	-	-	-	-
N68/W100, S	24	-	2	-	-	-	1	-	-	-	N84/W74, S	2	-	2	-	-	-	-	-	-	-
N68/W104, S	25	-	-	-	-	-	-	-	-	-	N84/W76, S	1	-	-	-	-	-	-	-	-	-
N72/W68, S	1	-	2	-	-	-	-	-	-	-	N84/W78, S	-	-	2	1	-	-	-	-	-	-
N72/W72, S	2	-	-	-	-	-	1	-	-	-	N84/W80, S	7	-	2	-	-	-	-	-	-	-
N72/W76, S	3	1	1	-	-	-	-	-	-	-	N84/W84, S	19	-	4	-	-	-	-	-	-	-
N72/W80, S	8	-	1	-	-	-	-	-	-	-	N84/W88, S	50	1	7	2	-	-	-	-	-	-
N72/W84, S	1	-	1	-	-	-	-	-	-	-	N84/W92, S	14	-	1	-	-	-	-	-	-	-
N72/W88, S	11	-	2	-	-	-	-	-	-	-	N84/W96, S	26	-	1	-	-	-	-	1	-	-
N72/W92, S	16	2	2	-	-	-	-	-	-	-	N84/W100, S	29	1	3	-	-	-	-	-	-	-
N72/W96, S	18	1	-	-	-	-	-	-	-	-	N84/W104, S	5	-	-	-	-	-	-	-	-	-
N72/W100, S	16	-	1	-	1	-	-	-	-	-	N84/W108, S	11	1	1	-	-	-	-	-	-	-
N72/W104, S	10	-	2	-	-	-	-	-	-	-	N84/W112, S	23	1	2	-	-	-	-	-	-	-
N72/W144, S	3	1	1	-	-	-	1	-	-	-	N84/W116, S	17	1	-	-	-	-	-	-	-	-
N 4/W102, S	6	1	2	-	1	-	-	-	-	-	N84/W120, S	5	1	-	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N84/W124, S	-	-	-	-	-	-	-	-	-	-
N84/W128, S	1	-	-	-	-	-	-	-	-	-
N84/W144, S	-	-	1	1	-	-	-	-	-	-
N84/W168, S	-	-	2	1	-	-	-	-	-	-
N84/W180, S	2	-	2	-	-	-	-	-	-	-
N86/W72, S	2	-	-	-	-	-	-	-	-	-
N84/W74, S	1	-	-	-	-	-	-	-	-	-
N86/W76, S	-	-	-	-	-	-	-	-	-	-
N86/W78, S	2	-	-	-	-	-	-	-	-	-
N88/W68, S	6	1	2	-	-	-	-	-	-	-
N88/W72, S	3	-	-	1	-	-	-	-	-	-
N88/W74, S	2	-	1	-	-	-	-	-	-	-
N88/W80, S	12	1	2	1	-	-	-	-	-	-
N88/W84, S	17	2	-	-	-	-	-	-	-	-
N88/W88, S	26	-	1	-	-	-	-	-	-	-
N88/W92, S	20	-	2	-	-	-	-	-	-	-
N88/W96, S	21	-	2	-	-	-	-	-	-	-
N88/W100, S	28	3	4	1	-	-	-	-	-	-
N88/W104, S	12	-	2	-	1	-	-	1	-	-
N88/W108, S	3	-	-	-	-	-	-	-	-	-
N88/W112, S	14	1	1	1	-	-	-	1	-	1
N88/W116, S	13	-	-	-	-	-	-	-	-	-
N88/W120, S	17	2	-	-	-	-	-	-	-	-
N88/W124, S	5	1	3	-	-	-	-	-	-	-
N88/W128, S	-	1	-	-	-	-	-	-	-	-
N90/W72, S	8	-	1	-	-	-	1	-	-	-
N90/W74, S	7	-	-	-	-	-	-	-	-	-
N92/W52, S	1	-	-	-	-	1	-	-	-	-
N92/W68, S	-	-	1	-	-	-	-	-	-	-
N92/W72, S	6	-	-	-	-	-	-	-	-	-
N92/W76, S	21	1	1	-	-	-	-	-	-	-
N92/W80, S	29	1	-	1	-	-	-	-	-	-
N92/W84, S	12	-	2	1	-	-	-	-	-	-
N92/W88, S	9	-	-	1	-	-	-	-	-	-
N92/W92, S	8	1	1	-	-	1	-	-	-	-
N92/W96, S	11	-	-	-	-	-	-	-	-	-
N92/W100, S	13	2	4	-	-	-	-	-	-	-
N92/W104, S	25	1	1	-	-	-	-	-	-	-
N92/W108, S	10	-	2	-	-	-	-	-	-	-
N92/W112, S	11	-	1	-	-	-	-	-	-	-
N92/W116, S	20	-	3	-	-	-	-	-	-	1
N92/W120, S	1	1	-	-	-	-	1	-	-	-
N92/W124, S	5	-	-	-	-	-	-	-	-	-
N92/W128, S	1	-	-	-	-	-	-	-	-	-
N92/W132, S	1	-	1	-	-	-	-	1	-	-
N92/W136, S	1	-	2	-	-	-	-	-	-	-
N93/W107, S	-	-	-	-	1	-	-	-	-	-
N96/W68, S	1	-	1	-	-	-	-	-	-	-
N96/W72, S	1	-	1	-	-	-	-	-	-	-
N96/W76, S	3	1	1	-	-	-	-	-	-	-
N96/W80, S	12	-	3	-	-	-	-	1	-	-
N96/W84, S	5	1	1	-	-	-	-	-	1	-
N96/W88, S	5	1	-	-	-	-	-	-	-	-
N96/W92, S	37	-	5	1	-	-	-	-	-	-
N96/W96, S	9	1	5	-	-	-	-	-	-	-
N96/W100, S	9	-	-	1	-	-	-	-	-	-
N96/W104, S	3	-	1	-	-	-	-	-	-	-
N96/W108, S	9	-	-	-	-	-	-	-	-	-
N96/W112, S	18	1	5	-	1	-	-	-	-	-
N96/W116, S	17	1	-	-	-	-	-	-	-	1
N96/W120, S	18	-	-	-	-	-	-	-	-	-
N96/W124, S	7	-	-	-	-	-	-	-	-	-
N96/W128, S	1	-	-	-	-	-	-	-	-	-
N96/W132, S	3	-	1	-	-	-	-	-	-	-
N96/W136, S	-	-	1	-	-	-	-	-	-	-
N100/W44, S	2	-	-	2	-	-	-	-	-	-
N100/W60, S	1	-	-	-	-	-	-	-	-	-
N100/W68, S	2	-	1	-	-	-	-	-	-	-
N100/W76, S	6	1	-	-	-	-	1	-	-	-
N100/W80, S	7	-	1	-	-	-	-	-	-	-
N100/W84, S	13	1	6	-	-	-	-	-	2	-
N100/W88, S	31	-	4	2	-	-	1	-	-	-
N100/W92, S	12	1	1	-	-	-	-	-	-	-
N100/W96, S	17	2	2	-	-	-	-	-	-	-
N100/W100, S	13	-	-	-	-	-	-	-	-	-
N100/W104, S	7	-	3	-	-	-	-	-	-	-
N100/W108, S	8	1	-	-	-	-	-	-	-	-
N100/W112, S	7	1	4	-	-	-	-	-	-	-
N100/W116, S	10	-	1	-	-	-	-	-	-	-
N100/W120, S	4	-	1	-	-	-	-	-	-	-
N100/W124, S	3	-	-	-	-	-	-	-	-	-
N100/W128, S	2	-	-	-	-	-	-	-	-	-
N100/W132, S	1	-	1	-	-	-	-	-	-	1
N100/W136, S	-	-	-	-	-	-	-	-	-	-
N100/W156, S	-	-	-	-	1	-	-	-	-	-
N100/W172, S	2	-	4	-	-	-	-	-	-	-
N104/W68, S	-	1	-	-	-	-	-	-	-	-
N104/W72, S	2	-	-	-	-	-	1	-	-	-
N104/W76, S	3	-	-	-	-	-	1	-	-	-
N104/W80, S	11	-	3	-	-	-	-	-	-	-
N104/W84, S	5	-	-	-	-	-	-	-	-	-
N104/W88, S	7	2	1	-	-	-	-	-	-	-
N104/W92, S	12	1	1	-	-	-	-	-	-	-
N104/W96, S	13	1	1	1	-	-	-	-	-	-
N104/W100, S	11	-	1	-	-	-	-	-	-	-
N104/W104, S	15	-	1	1	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N104/W108, S	10	4	-	-	-	-	-	-	-	-
N104/W112, S	5	-	-	-	-	-	-	-	1	-
N104/W116, S	6	1	-	-	-	-	-	-	-	-
N104/W120, S	-	-	-	-	-	-	-	-	-	-
N104/W124, S	5	-	-	-	-	-	-	-	-	-
N104/W128, S	1	-	-	-	1	-	-	-	-	-
N104/W132, S	3	-	-	1	-	-	-	-	-	-
N104/W136, S	2	-	2	-	-	-	-	-	-	1
N108/W68, S	-	-	-	-	-	-	-	-	-	-
N108/W72, S	-	1	-	-	-	-	-	-	-	-
N108/W76, S	-	-	-	-	-	-	-	-	-	-
N108/W80, S	-	1	-	-	-	-	1	-	2	-
N108/W84, S	21	-	3	-	-	-	-	-	-	-
N108/W88, S	14	1	-	2	-	-	-	-	-	-
N108/W92, S	1	-	-	-	-	-	-	-	-	-
N108/W96, S	1	-	-	-	-	-	-	-	-	-
N108/W100, S	14	-	-	-	-	-	-	-	2	-
N108/W104, S	2	-	3	-	-	-	-	-	3	-
N108/W108, S	3	-	-	-	-	-	-	-	-	-
N108/W112, S	5	-	1	1	-	-	-	-	-	-
N108/W114, S	1	-	-	-	-	-	-	-	-	-
N108/W116, S	3	1	1	-	-	-	-	-	-	-
N108/W118, S	-	-	-	-	-	-	-	-	-	-
N108/W120, S	2	-	2	-	-	-	-	-	-	-
N108/W124, S	10	1	1	-	-	-	-	-	2	-
N108/W128, S	7	3	-	-	-	-	-	-	-	-
N108/W132, S	12	1	-	-	-	-	-	-	-	-
N108/W136, S	4	1	1	-	-	-	-	-	-	-
N110/W112, S	1	-	-	-	-	-	-	-	-	-
N110/W114, S	5	-	1	-	-	-	-	-	-	-
N110/W116, S	5	-	-	-	-	-	-	-	-	-
N112/W68, S	4	1	-	-	-	-	-	-	-	-
N112/W72, S	-	-	-	-	-	-	-	-	-	-
N112/W76, S	1	-	-	-	-	-	-	-	-	-
N112/W80, S	5	-	-	-	-	-	-	-	-	-
N112/W84, S	-	2	1	-	-	-	-	-	-	-
N112/W88, S	8	2	-	-	-	-	-	-	1	-
N112/W92, S	9	-	1	-	-	-	-	-	-	-
N112/W96, S	9	-	1	-	-	-	-	-	-	-
N112/W100, S	23	-	1	-	-	-	1	1	3	-
N112/W104, S	21	-	-	-	-	-	-	-	-	-
N112/W108, S	16	1	1	-	-	-	-	-	-	-
N112/W112, S	3	1	-	-	-	-	-	1	1	-
N112/W114, S	4	-	-	-	-	-	-	-	3	-
N112/W116, S	5	-	-	-	-	-	-	-	-	-
N112/W120, S	2	-	1	1	-	-	-	-	-	-
N112/W124, S	4	-	-	-	-	-	-	-	-	-
N112/W128, S	11	1	1	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N112/W132, S	5	-	-	1	-	-	-	-	-	1
N112/W136, S	4	-	-	-	-	-	-	-	-	-
N114/W112, S	-	1	-	-	1	-	-	-	-	-
N116/W52, S	-	1	-	-	-	-	-	-	-	-
N116/W64, S	3	-	2	-	-	-	-	-	-	-
N116/W68, S	-	1	-	-	-	-	-	-	-	-
N116/W72, S	-	-	-	-	-	-	-	-	-	-
N116/W76, S	-	1	-	-	-	-	1	-	-	-
N116/W80, S	2	-	-	-	-	-	-	-	-	-
N116/W82, S	1	-	-	-	-	-	-	-	-	-
N116/W84, S	5	-	-	-	-	-	-	-	-	-
N116/W88, S	3	-	-	-	-	-	-	-	-	-
N116/W92, S	11	-	1	-	-	-	-	-	-	-
N116/W96, S	9	-	1	1	-	-	-	-	-	-
N116/W100, S	11	-	-	-	-	-	-	-	-	-
N116/W104, S	8	2	1	-	-	-	-	-	-	-
N116/W108, S	11	2	2	-	-	-	-	-	-	-
N116/W112, S	8	-	4	-	-	-	-	-	-	-
N116/W116, S	22	-	-	-	-	-	-	-	-	-
N116/W120, S	9	2	2	-	-	-	-	-	-	-
N116/W124, S	11	-	-	-	-	-	-	-	-	-
N116/W128, S	10	-	1	-	1	-	-	-	-	-
N116/W132, S	11	3	1	-	1	-	-	-	-	-
N116/W136, S	2	-	1	-	-	-	-	-	-	-
N116/W148, S	-	-	-	-	-	-	-	-	-	-
N116/W164, S	1	1	1	-	-	-	-	-	-	-
N118/W80, S	2	-	-	-	-	-	-	-	-	-
N118/W82, S	-	-	-	-	-	-	-	-	-	-
N120/W64, S	-	-	1	-	-	-	-	-	2	-
N120/W68, S	3	-	1	-	-	-	-	-	-	-
N120/W72, S	1	-	-	-	-	-	-	-	-	1
N120/W76, S	1	-	-	-	-	-	-	-	-	-
N120/W80, S	2	-	1	-	-	-	-	-	-	-
N120/W84, S	4	-	-	-	-	-	-	-	-	-
N120/W96, S	-	1	-	-	-	-	-	-	-	-
N120/W98, S	8	2	5	1	-	-	-	-	-	-
N120/W100, S	6	-	1	1	-	-	-	-	-	-
N120/W104, S	12	-	1	-	-	-	-	-	-	-
N120/W108, S	10	1	1	-	-	-	-	-	-	-
N120/W112, S	30	1	5	1	-	-	-	-	-	1
N120/W116, S	19	-	1	1	-	-	2	-	1	1
N120/W120, S	37	4	5	2	1	-	1	-	-	-
N120/W124, S	12	-	3	1	-	-	-	-	-	-
N120/W128, S	1	-	1	-	1	-	-	-	-	-
N120/W132, S	10	2	-	-	-	-	1	-	-	-
N120/W136, S	1	-	-	-	-	-	-	-	-	-
N122/W96, S	5	1	-	1	-	-	1	-	-	-
N122/W98, S	11	1	1	2	-	-	2	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N124/W60, S	2	2	-	-	-	-	-	-	-	-
N124/W64, S	4	-	-	-	-	-	-	-	-	-
N124/W68, S	4	2	2	-	-	-	-	-	-	-
N124/W72, S	4	-	1	-	-	-	-	-	-	-
N124/W76, S	-	-	1	-	-	-	-	-	-	-
N124/W80, S	4	-	-	-	-	-	-	-	-	-
N124/W84, S	5	1	-	-	-	-	-	-	-	-
N124/W88, S	14	1	3	-	-	-	-	-	-	-
N124/W92, S	-	-	1	-	-	-	-	-	-	-
N124/W96, S	37	3	10	-	-	-	1	-	-	-
N124/W100, S	14	1	5	2	-	-	-	-	-	-
N124/W104, S	19	2	4	1	-	-	1	-	-	-
N124/W108, S	8	3	1	-	-	-	1	-	-	-
N124/W112, S	13	2	2	1	-	-	-	-	-	-
N124/W116, S	24	1	4	1	-	-	-	-	-	-
N124/W120, S	9	-	1	-	-	-	-	-	-	-
N124/W124, S	6	3	2	-	-	-	-	-	-	-
N124/W128, S	3	-	-	-	-	-	-	-	-	-
N124/W132, S	1	-	1	-	-	-	-	-	-	-
N124/W136, S	5	-	1	-	-	-	-	-	-	-
N128/W60, S	1	-	-	-	-	-	-	-	-	-
N128/W64, S	2	-	-	1	-	-	-	-	-	-
N128/W68, S	1	-	-	-	-	-	-	-	-	-
N128/W72, S	2	-	-	-	-	-	-	-	-	-
N128/W76, S	-	-	-	-	-	-	-	-	-	-
N128/W80, S	1	-	-	-	-	-	-	-	-	-
N128/W84, S	4	-	-	-	-	-	-	-	-	-
N128/W88, S	7	-	-	1	-	-	-	-	-	-
N128/W90, S	10	-	2	-	-	-	-	-	-	-
N128/W92, S	13	-	1	-	-	-	-	-	-	-
N128/W94, S	7	1	-	-	-	-	-	-	-	-
N128/W96, S	36	3	4	2	-	-	-	-	-	-
N128/W100, S	41	3	1	1	-	-	-	-	-	-
N128/W104, S	33	-	4	2	-	-	-	-	13	-
N128/W108, S	44	2	7	-	1	1	2	-	1	-
N128/W112, S	7	1	2	1	-	1	-	-	-	-
N128/W116, S	26	4	4	-	-	1	-	-	-	-
N128/W120, S	4	1	3	1	-	-	-	-	-	-
N128/W124, S	1	-	1	-	-	-	-	-	-	-
N128/W128, S	8	-	-	-	-	-	-	-	-	-
N128/W132, S	3	1	-	-	-	-	-	-	-	-
N128/W136, S	2	-	-	-	-	-	-	-	-	-
N130/W88, S	2	-	-	-	-	-	-	-	-	-
N130/W90, S	5	-	-	-	-	-	-	-	-	-
N130/W92, S	10	-	1	-	-	-	-	-	-	-
N130/W94, S	15	-	1	-	-	-	-	-	-	-
N132/W52, S	-	-	3	-	-	-	-	-	-	-
N132/W64, S	3	1	2	-	-	-	1	-	-	-
N132/W68, S	1	-	3	-	-	-	-	-	-	-
N132/W72, S	3	-	1	1	-	-	-	-	-	-
N132/W76, S	-	-	-	-	-	-	-	-	-	-
N132/W80, S	7	-	2	-	-	-	1	-	-	5
N132/W84, S	11	2	-	-	-	-	-	-	-	9
N132/W88, S	6	-	2	-	-	-	-	-	-	-
N132/W90, S	10	-	-	1	-	-	-	-	-	-
N132/W92, S	17	1	8	-	-	-	-	-	-	-
N132/W96, S	7	1	2	-	-	-	-	-	-	1
N132/W100, S	2	-	3	-	-	-	-	-	-	-
N132/W104, S	12	1	3	-	-	-	-	-	27	-
N132/W108, S	6	1	2	1	-	-	-	-	-	-
N132/W112, S	4	-	3	-	-	-	-	-	-	-
N132/W116, S	8	-	-	-	-	-	-	-	-	-
N132/W120, S	-	-	1	-	-	-	-	-	-	-
N132/W124, S	-	-	-	-	-	-	-	-	-	-
N132/W128, S	2	-	-	-	-	-	1	1	-	-
N132/W132, S	4	-	-	-	-	-	-	-	-	-
N132/W136, S	-	1	-	-	-	-	-	-	-	-
N132/W156, S	3	-	-	1	-	-	-	-	-	1
N134/W88, S	8	-	1	-	-	-	-	-	-	-
N134/W90, S	3	-	-	-	-	-	-	-	-	-
N134/W112, S	6	1	-	-	-	-	1	-	-	-
N136/W76, S	-	-	-	-	-	-	-	-	-	-
N136/W80, S	9	-	-	-	-	-	-	-	-	-
N136/W84, S	13	-	4	-	-	-	1	-	-	-
N136/W88, S	7	-	1	-	-	-	-	-	-	-
N136/W92, S	33	-	4	-	-	1	2	-	-	-
N136/W96, S	13	2	-	-	-	-	-	-	-	-
N136/W100, S	1	1	-	-	-	-	-	-	-	-
N136/W104, S	14	-	1	-	-	-	-	-	-	-
N136/W108, S	5	-	3	-	-	-	-	-	-	1
N136/W112, S	-	-	-	-	-	-	-	-	-	-
N136/W114, S	-	-	-	-	-	-	-	-	-	-
N136/W116, S	10	2	3	-	-	-	-	-	-	-
N136/W118, S	3	-	-	-	-	-	-	-	-	-
N136/W120, S	2	-	1	-	-	-	-	-	-	-
N136/W[illegible] S	1	-	-	-	1	-	-	-	-	-
N136/W128, S	-	-	-	-	-	-	-	-	-	-
N136/W132, S	6	-	-	-	-	1	-	-	-	-
N136/W136, S	2	3	1	-	-	-	-	-	-	-
N138/W62, S	5	-	-	-	-	-	-	-	-	-
N138/W112, S	3	-	-	-	-	-	1	-	-	-
N138/W114, S	4	-	-	-	-	1	-	-	-	-
N140/W76, S	-	-	-	-	-	-	-	-	-	-
N140/W80, S	4	-	2	-	-	-	-	-	-	-
N140/W84, S	6	-	5	-	-	1	-	-	-	-
N140/W88, S	9	-	2	-	1	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N140/W92, S	18	2	-	-	-	-	-	-	-	-
N140/W96, S	12	-	-	1	-	-	-	-	-	-
N140/W100, S	1	-	1	-	-	-	-	-	-	-
N140/W104, S	-	-	-	-	-	1	1	-	-	-
N140/W108, S	11	-	2	-	-	-	-	-	-	-
N140/W112, S	11	-	1	-	1	-	-	-	-	-
N140/W116, S	6	1	1	1	-	-	-	-	-	-
N140/W120, S	-	-	-	-	-	-	2	-	-	-
N140/W124, S	2	1	-	-	-	-	-	1	-	-
N140/W128, S	-	-	-	-	-	-	-	-	-	-
N140/W132, S	9	-	-	-	-	-	-	-	-	-
N140/W136, S	10	-	-	-	-	-	-	-	-	-
N142/W128, S	3	-	1	-	-	-	1	-	-	-
N142/W130, S	1	-	1	-	-	-	-	-	-	-
N142/W132, S	1	-	2	-	-	-	-	-	-	-
N142/W134, S	4	-	-	-	-	-	-	-	-	-
N144/W76, S	1	-	-	-	-	-	-	-	-	-
N144/W80, S	3	1	-	-	-	-	-	-	-	-
N144/W84, S	2	1	1	-	-	-	-	-	-	-
N144/W88, S	9	-	3	1	-	-	-	-	-	-
N144/W92, S	4	1	1	-	-	-	-	-	-	-
N144/W96, S	10	-	1	-	-	-	-	-	-	-
N144/W100, S	4	-	-	-	-	1	-	-	-	-
N144/W104, S	6	1	-	-	-	-	-	-	-	-
N144/W108, S	3	-	3	1	-	-	-	-	-	-
N144/W112, S	7	-	3	-	-	-	-	-	-	-
N144/W116, S	3	-	1	-	-	-	-	-	-	-
N144/W120, S	3	2	-	-	-	-	-	-	-	-
N144/W124, S	3	-	-	-	-	-	-	-	-	-
N144/W128, S	3	-	-	-	-	-	-	-	-	-
N144/W130, S	6	-	-	-	-	-	-	-	-	-
N144/W132, S	9	-	2	-	-	-	-	-	-	-
N144/W134, S	4	-	-	-	-	-	-	-	-	-
N144/W136, S	-	3	1	-	-	-	-	-	-	-
N146/W126, S	-	-	-	-	-	-	-	-	-	-
N146/W130, S	2	-	-	1	-	-	-	-	-	-
N146/W132, S	-	1	-	-	-	-	-	-	-	-
N146/W134, S	2	-	-	-	-	-	-	-	-	-
N148/W76, S	-	-	-	-	-	-	-	-	-	-
N148/W80, S	3	-	-	-	-	-	-	-	-	-
N148/W84, S	-	-	-	-	-	-	-	-	-	-
N148/W88, S	1	-	-	-	-	-	-	-	-	-
N148/W92, S	2	1	1	-	-	-	-	-	-	13
N148/W96, S	2	-	1	-	-	-	-	-	-	1
N148/W100, S	1	-	-	1	-	-	1	-	-	-
N148/W104, S	1	-	-	-	-	-	-	-	-	-
N148/W108, S	1	-	2	-	-	1	1	-	-	-
N148/W112, S	6	1	1	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N148/W116, S	4	-	1	-	-	-	-	-	-	-
N148/W120, S	1	-	-	-	-	-	-	-	-	-
N148/W124, S	3	-	1	-	-	-	-	-	-	-
N148/W128, S	1	-	1	-	-	-	-	-	-	-
N148/W132, S	2	1	-	-	-	-	-	-	-	-
N148/W136, S	-	-	-	-	-	-	1	-	-	-
N148/W148, S	3	-	1	3	-	-	-	-	-	-
N148/W160, S	2	-	1	-	-	-	-	-	-	-
N152/W76, S	-	-	-	-	-	-	-	-	-	-
N152/W80, S	-	-	-	-	-	-	-	-	-	1
N152/W84, S	1	-	-	-	-	-	-	-	-	-
N152/W88, S	1	-	-	-	-	-	-	-	-	-
N152/W92, S	3	-	-	-	-	-	-	-	-	-
N152/W96, S	-	-	-	-	-	-	-	-	-	-
N152/W100, S	-	-	1	-	-	-	-	-	-	-
N152/W104, S	-	-	-	-	-	-	-	-	-	-
N152/W108, S	1	-	-	-	-	-	-	-	-	-
N152/W112, S	1	1	-	-	-	-	1	-	-	-
N152/W116, S	-	-	-	-	-	-	-	-	-	-
N152/W120, S	1	1	-	-	-	-	-	-	-	-
N152/W124, S	1	-	1	-	-	-	-	-	-	-
N152/W128, S	1	1	2	1	-	-	-	-	-	-
N152/W132, S	4	-	-	-	-	-	-	-	-	-
N152/W136, S	-	-	-	-	-	-	-	-	-	-

Unit 1 Excavations:

Provenience	A	B	C	D	E	F	G	H	I	J
N72/W99, L1	24	-	-	-	-	-	-	-	-	1
N72/W99, L2	2	12	1	-	-	-	-	-	-	-
N72/W99, L3	1	-	-	-	-	-	-	-	-	-
N72/W99, L4	2	-	-	-	-	-	-	-	-	-
N73/W99, L1	20	-	-	-	-	-	-	-	-	-
N73/W99, L2	8	-	-	-	-	-	-	-	-	-
N73/W99, L3	11	-	-	-	-	-	-	-	-	-
N73/W99, L4	4	-	-	-	-	-	-	-	-	-
N74/W96, L1	19	-	-	-	-	-	-	-	-	-
N74/W96, L2	13	-	-	-	-	-	-	-	-	-
N74/W96, L3	1	-	-	-	-	-	-	-	-	-
N74/W96, L4	-	-	-	-	-	-	-	-	-	-
N74/W97, L1	20	-	-	-	-	-	-	-	-	-
N74/W97, L2	40	-	-	-	-	-	-	-	-	-
N74/W97, L3	24	-	-	-	-	-	-	-	-	-
N74/W97, L4	6	-	-	-	-	-	-	-	-	-
N74/W98, L1	18	-	-	-	-	-	-	-	-	-
N74/W98, L2	39	-	1	1	-	-	-	-	-	-
N74/W98, L3	18	-	2	-	-	-	-	-	-	-
N74/W98, L4	3	-	-	-	-	-	-	-	-	-
N74/W99, L1	30	2	9	1	1	1	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N74/W99, L2	10	-	1	-	-	-	-	-	-	-
N74/W100, L1	26	1	2	-	-	-	-	-	-	1
N74/W100, L2	31	-	2	-	-	-	-	-	-	-
N74/W100, L3	21	-	-	1	-	-	-	-	-	-
N74/W100, L4	10	-	-	-	-	-	-	-	-	-
N74/W101, L1	19	-	-	-	-	-	-	-	-	-
N74/W101, L2	34	-	-	-	-	-	-	-	-	-
N74/W101, L3	11	-	-	-	-	-	-	-	-	-
N74/W101, L4	-	-	-	-	-	-	-	-	-	-
N75/W95, L1	14	-	-	1	2	-	-	-	-	-
N75/W96, L1	10	-	-	-	-	-	-	-	-	-
N75/W96, L2	22	-	2	-	-	-	-	-	-	-
N75/W96, L3	59	-	2	-	-	-	2	-	-	-
N75/W97, L1	9	-	-	-	-	-	-	-	-	-
N75/W97, L2	25	-	-	-	-	-	-	-	-	-
N75/W97, L3	22	-	1	-	-	-	1	-	-	-
N75/W98, L1	5	-	-	-	-	-	-	-	-	-
N75/W98, L2	19	1	-	-	-	-	-	-	-	-
N75/W98, L3	10	-	-	-	-	-	-	-	-	-
N75/W99, L1	20	-	-	-	-	-	-	-	-	-
N75/W99, L2	24	1	1	-	-	-	-	-	-	-
N75/W99, L3	9	-	-	-	-	-	-	-	-	-
N76/W91, L1	13	-	-	-	-	-	-	-	-	-
N76/W91, L2	18	-	2	-	-	-	1	-	-	-
N76/W91, L3	23	-	3	-	-	-	2	-	-	-
N76/W92, L1	19	-	-	-	-	-	-	-	-	1
N76/W92, L2	8	-	-	-	-	-	-	-	-	-
N76/W93, L1	46	-	2	-	-	-	-	-	-	1
N76/W93, L2	20	1	2	1	-	-	-	-	-	-
N76/W93, L3	21	-	1	-	-	-	-	-	-	-
N76/W93, L4	11	-	-	-	1	-	-	-	-	-
N76/W93, L5	2	-	-	-	-	-	-	-	-	-
N76/W94, L1	21	1	1	-	-	-	-	-	-	-
N76/W94, L2	13	-	1	-	-	-	-	1	-	-
N76/W94, L3	10	1	-	-	-	-	-	-	-	-
N76/W94, L4	9	-	-	-	-	-	-	-	-	-
N76/W94, L5	1	-	-	-	-	-	-	-	-	-
N76/W95, L1	50	-	1	1	-	1	-	-	-	-
N76/W95, L2	24	1	4	-	-	-	-	-	-	-
N76/W95, L3	19	-	-	-	-	-	-	-	-	-
N76/W95, L4	5	-	-	-	-	-	-	-	-	-
N76/W96, L1	13	-	3	-	-	-	-	-	-	-
N76/W96, L2	32	1	5	1	-	-	-	-	-	-
N76/W96, L3	33	-	4	-	1	-	1	-	-	-
N76/W97, L1	13	-	1	1	-	-	1	-	-	-
N76/W97, L2	23	-	3	-	-	-	-	-	-	-
N76/W97, L3	30	-	1	-	-	-	1	-	-	-
N76/W98, L1	2	-	-	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N76/W98, L2	18	-	2	-	-	-	-	-	-	-
N76/W98, L3	20	1	2	-	-	-	-	-	-	-
N76/W99, L1	22	-	-	-	-	-	-	-	-	-
N76/W99, L2	16	-	-	-	-	-	-	-	-	-
N76/W99, L3	19	-	-	-	1	-	-	-	-	-
N76/W99, L4	17	-	-	-	-	-	-	-	-	-
N76/W99, L5	9	-	-	-	-	-	-	-	-	-
N77/W91, L1	20	-	-	-	-	-	-	-	-	-
N77/W91, L2	42	1	1	-	-	-	-	-	-	-
N77/W91, L3	27	-	1	-	-	-	-	-	-	-
N77/W91, L4	8	-	-	-	-	-	-	-	-	-
N77/W92, L1	17	-	-	-	-	-	-	-	-	-
N77/W92, L2	14	-	1	-	-	1	-	-	-	-
N77/W93, L1	50	-	1	-	-	-	-	-	-	-
N77/W93, L2	19	-	1	-	-	-	-	-	-	-
N77/W93, L3	17	-	1	-	-	-	-	1	-	-
N77/W93, L4	13	-	-	-	-	-	-	1	-	-
N77/W93, L5	2	-	-	-	-	-	-	-	-	-
N77/W94, L1	26	-	1	-	-	-	-	-	-	-
N77/W94, L2	15	-	2	-	-	-	-	-	-	-
N77/W95, L1	48	-	-	-	-	-	-	-	-	-
N77/W95, L2	28	-	-	1	-	1	-	-	-	-
N77/W96, L1	17	-	-	-	-	-	-	-	-	-
N77/W96, L2	31	-	-	-	-	-	-	-	-	-
N77/W96, L3	21	-	1	-	-	-	2	-	-	-
N77/W97, L1	4	-	-	-	-	-	-	1	-	-
N77/W97, L2	23	-	3	-	-	-	-	-	-	-
N77/W97, L3	25	-	1	-	-	-	-	-	-	-
N77/W98, L1	23	1	1	-	-	-	-	-	-	-
N77/W98, L2	17	-	-	-	-	-	-	-	-	-
N77/W99, L1	7	-	-	-	-	-	-	-	-	-
N77/W99, L2	28	-	-	-	-	-	-	-	-	-
N77/W99, L3	12	-	1	-	-	-	-	-	-	-
N77/W99, L4	11	-	-	-	-	-	-	-	-	-
N77/W99, L5	10	-	-	-	-	-	-	-	-	-
N77/W99, L6	16	-	-	-	-	-	-	-	-	-
N78/W88, L1	2	-	-	-	-	-	-	-	-	-
N78/W88, L2	11	-	1	-	-	-	-	-	-	-
N78/W88, L3	20	-	-	-	-	-	-	-	-	-
N78/W88, L4	12	-	1	-	-	-	-	-	-	-
N78/W89, L1	20	-	-	-	-	-	-	-	-	-
N78/W89, L2	36	1	1	-	-	-	-	-	-	-
N78/W89, L3	25	-	-	-	-	-	-	-	-	-
N78/W89, L4	12	-	-	-	-	-	-	-	-	-
N78/W90, L1	3	-	-	-	-	-	-	-	-	-
N78/W90, L2	34	1	-	-	-	-	-	-	-	-
N78/W90, L3	13	-	1	-	-	-	-	-	-	-
N78/W90, L4	17	1	1	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N78/W90, L5	7	-	1	-	-	-	-	-	-	-
N78/W90, L6	10	-	-	-	-	-	-	-	-	-
N78/W90, L7	21	-	-	-	-	-	-	-	-	-
N78/W91, L1	2	-	-	-	-	-	-	-	-	-
N78/W91, L2	9	-	-	-	-	-	-	-	-	-
N78/W91, L3	11	-	-	-	-	-	-	-	-	-
N78/W91, L4	3	-	-	-	-	-	-	-	-	-
N78/W92, L1	24	1	-	-	-	-	-	-	-	-
N78/W92, L2	24	-	-	-	-	1	-	-	-	-
N78/W92, L3	5	1	-	-	-	-	-	-	-	-
N78/W93, L1	3	-	-	-	-	-	-	-	-	-
N78/W93, L2	18	-	-	-	-	-	-	-	-	-
N78/W93, L3	10	-	2	-	-	-	-	-	-	-
N78/W93, L4	16	-	-	-	-	-	-	-	-	-
N78/W93, L5	5	-	-	-	-	-	-	-	-	-
N78/W93, L6	11	-	-	-	-	-	-	-	-	-
N78/W93, L7	5	-	-	-	-	-	-	-	-	-
N78/W94, L1	12	-	-	-	-	-	-	-	-	-
N78/W94, L2	28	-	1	-	-	-	1	-	-	-
N78/W94, L3	34	-	-	-	-	-	-	-	-	-
N78/W95, L1	68	-	5	-	-	-	1	1	-	-
N78/W95, L2	26	1	1	-	-	-	-	1	-	-
N78/W96, L1	40	1	-	-	-	-	-	-	-	-
N78/W96, L2	34	-	2	-	-	-	-	-	-	-
N78/W97, L1	39	-	-	-	-	-	1	-	-	-
N78/W97, L2	46	-	2	-	-	-	-	-	-	-
N78/W98, L1	29	-	-	-	-	-	-	-	-	-
N78/W98, L2	22	2	1	-	-	1	-	-	-	-
N79/W88, L1	2	-	-	-	-	-	-	-	-	-
N79/W88, L2	1	-	-	-	-	-	-	-	-	-
N79/W89, L1	7	-	-	-	-	-	-	-	-	-
N79/W89, L2	27	-	1	-	-	-	-	-	-	-
N79/W89, L3	23	-	4	-	-	-	-	-	-	-
N79/W89, L4	15	-	-	-	-	-	-	-	-	-
N79/W90, L1	8	-	-	-	-	-	-	-	-	-
N79/W90, L2	11	-	-	-	-	-	-	-	-	-
N79/W90, L3	22	-	1	-	-	-	-	-	-	-
N79/W90, L4	30	-	-	1	-	-	-	-	-	-
N79/W90, L5	15	-	-	-	-	-	-	-	-	-
N79/W91, L1	6	-	-	-	-	-	-	-	-	-
N79/W91, L2	5	-	-	-	-	-	-	-	-	-
N79/W91, L3	31	-	1	-	-	-	-	-	-	-
N79/W91, L4	9	-	-	-	-	-	-	-	-	-
N79/W91, L5	10	-	-	-	-	-	-	-	-	-
N79/W92, L1	25	-	1	-	-	-	-	-	-	-
N79/W92, L2	18	-	2	-	-	-	-	-	-	-
N79/W92, L3	25	-	1	-	-	-	-	-	-	-
N79/W93, L1	1	-	-	-	-	-	-	-	-	-
N79/W93, L2	13	-	1	-	-	-	1	-	-	-
N79/W93, L3	23	-	-	-	-	-	-	-	-	-
N79/W93, L4	28	-	-	-	-	-	-	-	-	-
N79/W94, L1	9	-	-	-	-	-	1	-	-	-
N79/W94, L2	48	-	1	-	-	-	-	-	-	-
N79/W94, L3	20	-	-	-	-	-	-	-	-	-
N79/W95, L1	40	1	1	-	-	-	-	-	-	-
N79/W95, L2	22	-	-	-	-	1	1	-	-	-
N79/W96, L1	52	1	-	-	-	-	-	1	-	-
N79/W96, L2	55	-	2	-	-	-	-	-	-	-
N79/W97, L1	50	1	1	-	-	-	-	-	-	-
N79/W97, L2	31	-	-	1	2	-	1	-	-	-
N79/W98, L1	44	-	1	-	-	-	-	-	-	-
N79/W98, L2	19	-	2	1	-	-	1	-	-	-
N80/W89, L1	1	-	-	-	-	-	-	-	-	-
N80/W89, L2	13	-	1	-	-	-	-	-	-	-
N80/W89, L3	6	-	-	-	-	-	-	-	-	-
N80/W89, L4	6	-	-	-	-	-	-	-	-	-
N80/W90, L1	5	-	1	-	-	-	-	-	-	-
N80/W90, L2	21	-	2	-	-	-	-	-	-	-
N80/W90, L3	14	1	-	-	-	-	-	-	-	-
N80/W90, L4	16	-	3	-	-	1	-	-	-	-
N80/W90, L5	10	1	2	-	-	-	-	-	-	-
N80/W91, L1	10	-	-	-	-	-	-	-	-	-
N80/W91, L2	31	-	2	-	-	-	-	-	-	-
N80/W91, L3	29	-	-	-	-	-	-	-	-	-
N80/W91, L4	20	-	3	-	-	-	-	-	-	-
N80/W92, L1	7	-	-	-	-	-	-	-	-	-
N80/W92, L2	39	-	-	-	-	-	-	-	-	-
N80/W92, L3	40	-	1	1	-	-	-	-	-	-
N80/W92, L4	40	1	1	-	-	-	-	-	-	-
N80/W93, L1	15	-	3	-	-	-	-	1	-	-
N80/W93, L2	12	-	-	1	-	-	-	-	-	-
N80/W93, L3	38	-	1	-	-	-	2	-	-	-
N80/W94, L1	13	-	1	-	-	-	-	-	-	-
N80/W94, L2	50	-	-	-	-	-	-	-	-	-
N80/W94, L3	61	-	4	-	-	-	-	-	-	1
N80/W95, L1	18	-	-	-	-	-	-	-	-	-
N80/W95, L2	49	-	2	-	-	-	1	1	-	-
N80/W95, L3	46	-	1	-	-	-	1	-	-	-
N80/W96, L1	27	-	-	-	-	-	-	-	-	-
N80/W96, L2	47	1	-	-	-	-	-	-	-	-
N80/W96, L3	34	1	1	-	-	-	1	-	-	-
N80/W97, L1	31	-	-	-	-	-	-	-	-	-
N80/W97, L2	51	-	1	-	-	-	1	-	-	-
N80/W97, L3	40	-	3	1	-	-	-	-	-	-
N81/W90, L1	-	-	-	-	-	-	-	-	-	-
N81/W90, L2	6	-	-	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N81/W90, L3	21	-	-	-	-	-	-	-	-	-
N81/W90, L4	12	-	-	-	-	-	-	-	-	-
N81/W91, L1	21	1	2	-	-	-	-	-	-	-
N81/W91, L2	21	-	-	-	-	-	-	-	-	-
N81/W91, L3	14	-	3	-	-	-	-	-	-	-
N81/W92, L1	11	1	-	-	-	-	-	-	-	-
N81/W92, L2	2	-	-	-	-	-	-	-	-	-
N81/W92, L3	13	-	1	-	-	-	-	-	-	-
N81/W93, L1	15	1	2	-	-	-	-	-	-	-
N81/W93, L2	27	1	1	-	1	-	-	-	-	-
N81/W93, L3	17	-	-	-	-	-	-	-	-	-
N81/W94, L1	41	-	3	1	-	-	-	-	-	-
N81/W94, L2	30	-	4	1	-	-	-	-	-	-
N81/W94, L3	12	1	-	1	-	-	-	-	-	-
N81/W95, L1	16	-	-	-	-	-	-	-	-	-
N81/W95, L2	31	2	-	-	-	-	-	-	-	-
N81/W95, L3	46	1	6	-	-	-	-	-	-	-
N81/W96, L1	15	-	-	-	-	-	-	-	-	-
N81/W96, L2	7	-	3	-	-	-	-	-	-	-
N81/W96, L3	36	2	1	-	-	1	-	-	-	-
N81/W97, L1	45	3	2	-	-	-	-	-	-	-
N81/W97, L2	28	-	1	-	-	-	-	-	-	-
N81/W97, L3	24	-	2	-	-	-	1	-	-	-
N82/W90, L1	-	-	-	-	-	-	-	-	-	-
N82/W90, L2	2	-	-	-	-	-	-	-	-	-
N82/W90, L3	4	1	-	-	-	-	-	-	-	-
N82/W90, L4	6	2	-	1	-	-	-	-	-	-
N82/W91, L1	22	-	2	-	-	-	-	-	-	-
N82/W91, L2	37	1	2	2	-	-	-	-	-	-
N82/W91, L3	13	1	-	1	-	-	-	-	-	-
N82/W92, L1	48	-	-	-	-	-	-	-	-	-
N82/W92, L2	18	1	4	-	-	-	-	-	-	-
N82/W92, L3	22	-	-	-	-	-	2	-	-	-
N82/W93, L1	-	-	-	-	-	-	-	-	-	-
N82/W93, L2	21	1	2	-	-	-	-	-	-	-
N82/W93, L3	17	-	3	1	-	-	-	-	-	-
N82/W93, L4	28	-	3	1	-	-	-	1	-	-
N82/W94, L1/2	42	1	3	-	-	-	-	-	-	-
N82/W94, L3	85	-	2	2	-	-	-	-	-	-
N82/W94, L4	51	1	1	-	1	-	1	-	-	-
N82/W95, L1	55	2	-	-	-	-	-	-	-	-
N82/W95, L2	38	1	-	-	-	-	2	-	-	-
N82/W95, L3	24	-	2	1	-	-	-	-	-	-
N82/W96, L1	31	-	-	-	1	-	-	-	-	-
N82/W96, L2	51	-	2	-	-	-	-	1	-	-
N82/W96, L3	70	-	4	1	-	1	-	1	-	-
N82/W97, L1	9	-	-	-	-	-	-	-	-	-
N82/W97, L2	19	1	-	-	-	-	-	-	-	-
N82/W97, L3	14	1	1	-	-	-	-	-	-	-
N82/W97, L4	14	-	1	-	-	-	-	-	-	-
N83/W91, L1	7	-	-	-	-	-	-	-	-	-
N83/W91, L2	23	-	1	-	-	-	-	-	-	-
N83/W91, L3	18	1	2	-	-	-	-	-	-	-
N83/W91, L4	18	1	-	-	-	-	-	-	-	-
N83/W92, L1	25	-	-	1	-	-	-	-	-	-
N83/W92, L2	10	-	-	-	-	-	-	-	-	-
N83/W92, L3	28	-	2	-	-	-	-	-	-	-
N83/W92, L4	14	-	-	-	-	-	-	1	-	-
N83/W93, L1	17	-	-	2	-	-	-	1	-	-
N83/W93, L2	37	-	-	1	-	-	-	-	-	-
N83/W93, L3	34	-	3	-	-	-	-	-	-	-
N83/W93, L4	23	-	3	1	-	-	-	-	-	-
N83/W94, L1	37	2	2	-	-	-	-	-	-	-
N83/W94, L2	31	-	-	1	1	-	1	-	-	-
N83/W94, L3	55	1	1	1	-	1	-	-	-	-
N83/W95, L1	15	-	-	-	-	-	-	-	-	-
N83/W95, L2	57	-	2	1	-	-	-	-	-	-
N83/W95, L3	74	1	3	-	-	-	2	1	-	-
N83/W95, L4	52	1	1	1	-	-	-	-	-	-
N83/W96, L1	3	1	1	-	-	-	-	-	-	-
N83/W96, L2	25	2	1	-	-	-	-	-	-	-
N83/W96, L3	60	1	4	1	-	-	-	-	-	1
N83/W96, L4	39	-	1	-	1	-	1	1	-	-
N83/W97, L1	23	-	-	-	-	-	-	-	-	-
N83/W97, L2	45	-	-	2	-	-	-	-	-	-
N83/W97, L3	58	-	5	1	-	1	-	2	-	1
N83/W97, L4	20	-	-	-	-	-	-	-	-	-
N84/W91, L1	33	1	1	-	-	-	-	-	-	-
N84/W91, L2	34	-	1	-	-	-	-	-	-	-
N84/W91, L3	32	-	4	-	-	-	-	-	-	-
N84/W91, L4	21	-	-	-	-	-	-	-	-	-
N84/W91, L5	8	-	1	-	-	-	-	1	-	-
N84/W93, L1	14	-	-	-	-	-	-	-	-	-
N84/W93, L2	24	1	4	-	-	-	-	-	-	-
N84/W93, L3	71	3	4	1	-	1	1	-	-	-
N84/W93, L4	15	1	-	-	-	-	1	-	-	-
N84/W94, L1	33	-	2	-	-	-	-	-	-	-
N84/W94, L2	24	-	1	-	-	-	-	-	-	-
N84/W94, L3	82	1	6	-	-	-	-	2	-	-
N84/W94, L4	21	-	-	-	-	-	-	-	-	-
N84/W95, L1	16	-	-	-	-	-	-	-	-	-
N84/W95, L2	23	1	1	-	-	-	-	-	-	-
N84/W95, L3	100	1	8	1	-	-	1	1	-	-
N84/W95, L4	40	-	1	-	-	-	-	-	-	-
N84/W96, L1	16	-	-	-	-	-	-	-	-	-
N84/W96, L2	26	1	-	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N84/W96, L3	51	2	3	1	-	-	1	-	-	-
N84/W96, L4	52	2	1	-	-	-	1	-	-	-
N84/W97, L1	22	-	-	-	-	-	-	-	-	-
N84/W97, L2	51	-	-	-	-	-	-	-	-	-
N84/W97, L3	58	-	5	-	1	-	-	-	-	-
N84/W97, L4	84	-	1	-	-	-	-	-	-	-
N84/W97, L5	2	-	-	-	-	-	-	-	-	-
N84/W98, L1	18	-	-	1	-	-	1	-	-	-
N84/W98, L2	12	-	-	-	-	-	-	-	-	-
N84/W98, L3	18	-	-	-	-	-	-	-	-	-
N84/W99, L1	33	-	3	-	-	-	-	-	-	-
N84/W99, L2	38	-	1	-	-	-	-	1	-	-
N84/W99, L3	20	1	2	-	-	-	-	-	-	-
N85/W91, L1	10	1	2	-	-	-	-	-	-	-
N85/W91, L2	5	5	-	1	-	-	1	-	-	-
N85/W91, L3	17	-	-	-	-	-	-	-	-	-
N85/W91, L4	7	-	-	-	-	-	-	-	-	-
N85/W91, L5	7	-	-	-	-	-	-	-	-	-
N85/W91, L6	6	-	-	-	-	-	-	-	-	-
N85/W92, L1	34	-	3	-	-	-	1	-	-	-
N85/W92, L2	29	1	1	-	-	-	-	-	-	-
N85/W92, L3	33	-	2	-	-	-	-	-	-	-
N85/W93, L1	15	-	-	-	-	-	-	-	-	-
N85/W93, L2	29	1	2	-	-	-	-	-	-	-
N85/W93, L3	23	-	1	-	-	-	-	-	-	-
N85/W93, L4	16	1	-	-	-	-	-	-	-	-
N85/W94, L1	40	-	-	-	-	-	-	-	-	-
N85/W94, L2	46	-	-	-	-	-	-	-	-	-
N85/W94, L3	24	-	3	-	-	1	1	-	-	-
N85/W94, L4	33	-	-	-	-	-	-	-	-	-
N85/W95, L1	41	1	-	-	-	-	-	-	-	-
N85/W95, L2	30	-	1	-	-	-	-	-	-	-
N85/W95, L3	37	-	-	-	-	-	-	-	-	-
N85/W95, L4	41	-	4	1	-	-	-	-	-	-
N85/W96, L1	22	-	-	-	-	-	-	-	-	-
N85/W96, L2	12	-	-	-	1	-	-	-	-	-
N85/W96, L3	38	3	2	-	-	-	-	-	-	-
N85/W96, L4	40	2	4	-	-	-	-	-	-	-
N85/W97, L1	40	-	-	-	-	-	-	-	-	-
N85/W97, L2	25	-	-	-	-	-	-	1	-	-
N85/W97, L3	57	-	3	1	1	-	-	-	-	-
N85/W97, L4	63	-	2	-	-	-	1	1	-	-
N85/W98, L1	73	-	-	-	-	-	-	-	-	1
N85/W98, L2	81	1	1	-	-	-	1	-	-	1
N85/W98, L3	42	1	2	2	1	-	-	1	-	-
N85/W99, L1	35	-	1	1	-	-	-	-	-	-
N85/W99, L2	26	2	-	-	1	-	-	1	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N85/W99, L3	30	2	-	-	-	-	1	-	-	-

Unit 2 Excavations:

Provenience	A	B	C	D	E	F	G	H	I	J
N106/W96, L1	26	1	-	-	-	-	-	-	-	-
N106/W96, L2	16	-	-	-	-	-	-	1	-	-
N106/W96, L3	9	-	4	-	-	-	-	-	-	-
N106/W96, L4	10	1	1	-	-	-	-	-	-	-
N106/W97, L1	21	-	-	-	-	-	-	-	-	-
N106/W97, L2	12	-	1	1	-	-	-	-	-	-
N106/W97, L3	20	-	2	-	-	-	-	-	-	-
N106/W97, L4	9	-	-	-	-	-	-	-	-	-
N107/W95, L1	16	1	1	-	-	-	-	-	-	-
N107/W95, L2	8	-	-	-	-	-	-	-	-	-
N107/W95, L3	7	3	1	1	-	1	-	1	-	-
N107/W95, L4	5	1	-	-	-	-	-	-	-	-
N107/W95, L5	5	-	-	-	-	-	-	-	-	-
N107/W96, L1	9	-	-	-	-	-	-	-	-	-
N107/W96, L2	8	-	-	-	-	-	-	-	-	1
N107/W96, L3	24	-	-	-	-	-	-	-	-	-
N107/W96, L4	11	-	1	1	-	-	-	-	-	-
N107/W96, L5	15	-	-	-	-	-	-	-	-	-
N107/W97, L1	6	-	-	-	-	-	-	-	-	-
N107/W97, L2	29	1	1	-	-	-	-	1	-	-
N107/W97, L3	12	1	-	-	-	-	-	-	-	-
N107/W97, L4	21	-	3	-	-	-	-	-	-	-
N107/W97, L5	7	-	-	-	-	-	-	-	-	-
N107/W97, L6	6	-	-	-	-	-	-	-	-	-
N107/W98, L1	3	-	-	-	-	-	-	-	-	-
N107/W98, L2	4	-	-	-	-	-	-	-	-	-
N107/W98, L3	3	-	1	1	-	-	-	-	-	-
N107/W98, L4	1	-	-	-	-	-	-	-	-	-
N107/W98, L5	4	-	-	-	-	-	-	-	-	-
N108/W93, L1	7	-	1	-	-	-	-	-	-	-
N108/W93, L2	8	1	-	-	-	-	-	-	-	-
N108/W93, L3	12	1	-	-	-	-	-	-	1	-
N108/W93, L4	8	-	-	-	-	-	-	-	-	-
N108/W94, L1	12	-	-	-	-	-	-	-	-	-
N108/W94, L2	6	1	-	-	-	-	-	-	-	-
N108/W94, L3	22	-	1	-	-	-	-	1	-	-
N108/W94, L4	11	1	-	-	-	-	-	-	-	-
N108/W94, L5	11	-	-	-	-	-	-	-	-	-
N108/W95, L1	6	1	-	1	-	-	-	-	-	1
N108/W95, L2	3	-	-	-	-	-	-	-	-	-
N108/W95, L3	5	-	-	-	-	-	1	-	-	-
N108/W95, L4	14	-	-	-	-	-	-	1	-	-

Provenience	A	B	C	D	E	F	G	H	I	J	Provenience	A	B	C	D	E	F	G	H	I	J
N108/W95, L5	7	-	-	-	-	1	-	-	-	-	N110/W96, L2	19	-	1	-	-	-	-	-	3	-
N108/W96, L1	9	1	-	-	-	-	-	-	-	-	N110/W96, L3	9	-	-	-	-	1	-	1	-	-
N108/W96, L2	11	-	2	-	-	-	-	-	-	-	N110/W96, L4	3	-	1	-	-	-	-	-	-	-
N108/W96, L3	4	-	-	-	-	-	-	-	-	-	N110/W96, L5	4	-	2	-	-	-	-	-	-	-
N108/W96, L4	8	-	-	1	-	-	-	-	-	-	N110/W97, L1	10	1	-	-	-	-	-	-	-	-
N108/W96, L5	8	1	2	-	-	1	-	1	-	-	N110/W97, L2	10	-	-	-	-	-	1	-	-	-
N108/W97, L1	17	-	-	-	-	-	-	-	-	-	N110/W97, L3	10	1	6	-	-	-	-	-	-	-
N108/W97, L2	19	-	-	-	1	-	-	-	-	-	N110/W97, L4	10	-	-	-	-	-	-	-	-	-
N108/W97, L3	21	-	-	-	-	-	1	-	-	-	N110/W97, L5	8	-	-	-	-	-	-	-	-	-
N108/W97, L4	15	-	2	-	-	-	-	-	-	-	N110/W98, L1	18	-	-	-	-	-	-	-	-	-
N108/W97, L5	4	-	-	-	-	-	-	-	-	-	N110/W98, L2	32	-	-	-	-	-	-	-	-	-
N108/W98, L1	20	-	-	-	-	-	-	-	-	-	N110/W98, L3	38	1	1	-	-	1	1	1	-	-
N108/W98, L2	9	-	-	-	-	-	-	-	-	-	N110/W98, L4	15	-	2	-	-	-	-	-	-	-
N108/W98, L3	19	-	-	1	-	-	-	-	1	-	N110/W99, L1	8	1	-	-	-	-	-	-	-	-
N108/W98, L4	14	-	-	-	-	-	-	-	-	-	N110/W99, L2	6	-	-	-	-	-	-	-	-	-
N108/W98, L5	5	-	-	-	-	-	-	-	-	-	N110/W99, L3	9	-	-	-	-	-	-	-	-	-
N108/W100, L1	27	-	-	-	-	-	-	-	2	-	N110/W99, L4	1	-	-	-	-	-	-	-	-	-
N108/W100, L2	18	-	-	-	-	-	-	-	-	-	N111/W95, L1	14	-	-	-	-	-	-	-	-	-
N108/W100, L3	21	-	-	-	-	-	-	1	-	-	N111/W95, L2	12	-	-	-	-	-	-	-	-	-
N108/W100, L4	14	-	-	-	-	-	-	-	-	-	N111/W95, L3	7	-	-	-	-	-	-	-	-	-
N108/W100, L5	9	-	-	-	-	-	-	-	-	-	N111/W95, L4	2	-	1	-	-	-	-	-	-	-
N109/W94, L1	5	-	1	-	-	-	-	-	-	-	N111/W96, L1	10	-	-	-	-	-	-	1	-	-
N109/W94, L2	2	-	-	-	-	-	-	-	-	-	N111/W96, L2	11	-	-	-	-	-	-	-	-	-
N109/W94, L3	6	-	-	-	-	-	-	-	-	-	N111/W96, L3	4	1	-	-	-	-	-	-	-	-
N109/W94, L4	9	-	1	-	-	-	-	1	-	-	N111/W96, L4	7	1	-	-	-	-	-	-	-	-
N109/W94, L5	8	-	-	-	-	-	-	-	-	-	N111/W97, L1	4	-	-	1	-	-	-	-	-	-
N109/W94, L6	5	-	1	-	-	-	-	-	-	-	N111/W97, L2	9	1	-	-	-	-	-	-	-	-
N109/W96, L1	15	-	-	-	-	-	-	-	-	-	N111/W97, L3	15	-	-	1	-	-	-	-	-	-
N109/W96, L2	23	-	1	-	-	-	-	-	-	-	N111/W97, L4	5	-	1	-	-	-	-	-	-	-
N109/W96, L3	24	-	1	-	-	-	-	1	-	-	N111/W98, L1	21	1	-	-	-	-	-	-	-	-
N109/W96, L4	12	-	-	-	-	-	-	-	-	-	N111/W98, L2	3	-	1	-	-	-	-	-	-	-
N109/W96, L5	17	-	-	-	-	-	-	-	-	-	N111/W98, L3	10	-	-	-	1	-	2	-	-	-
N109/W96, L6	16	-	-	-	-	-	-	-	-	-	N111/W98, L4	12	-	-	-	-	-	-	-	-	-
N109/W97, L1	19	-	-	-	-	-	-	-	-	-	N111/W99, L1	11	-	-	-	-	-	-	-	-	-
N109/W97, L2	16	-	-	-	-	-	-	-	-	-	N111/W99, L2	5	-	-	-	-	-	-	-	-	-
N109/W97, L3	17	-	4	-	-	-	-	2	-	-	N111/W99, L3	6	1	1	-	-	-	-	-	-	-
N109/W97, L4	7	-	1	-	-	-	-	-	-	-	N111/W99, L4	3	-	-	-	-	-	-	-	-	-
N109/W97, L5	8	-	1	-	-	-	-	-	-	-	N112/W95, L1	5	-	-	-	-	-	-	-	-	-
N109/W98, L1	24	1	2	-	-	-	-	-	-	-	N112/W95, L2	5	-	-	-	-	-	-	-	-	-
N109/W98, L2	11	-	-	-	-	-	-	-	-	-	N112/W95, L3	5	-	-	-	-	-	-	1	-	-
N109/W98, L3	13	-	1	-	-	-	1	-	-	-	N112/W95, L4	3	-	-	1	-	-	-	-	-	-
N109/W98, L4	12	-	-	-	-	-	-	-	-	-	N112/W95, L5	2	1	-	-	-	-	-	-	-	-
N109/W98, L5	8	-	-	-	-	-	-	-	-	-	N112/W96, L1	10	-	2	1	-	-	-	-	-	-
N110/W95, L1	10	-	-	-	-	-	-	-	-	-	N112/W96, L2	14	-	-	-	-	-	-	-	-	-
N110/W95, L2	10	-	1	-	-	-	-	-	-	-	N112/W96, L3	16	-	1	-	-	-	1	-	-	-
N110/W95, L3	9	-	1	-	-	-	-	-	-	-	N112/W96, L4	6	-	-	-	-	-	-	-	-	-
N110/W95, L4	4	1	-	-	-	-	-	-	-	-	N112/W97, L1	12	-	1	-	-	-	-	-	-	-
N110/W96, L1	8	-	-	-	-	-	-	-	-	-	N112/W97, L2	8	-	2	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N112/W97, L3	12	-	2	-	-	1	-	-	-	-
N112/W97, L4	9	1	-	-	-	-	-	1	-	-
N112/W98, L1	17	1	1	-	-	-	-	1	-	-
N112/W98, L2	9	-	1	-	-	-	-	-	-	-
N112/W98, L3	13	-	2	1	-	-	1	-	-	-
N112/W98, L4	6	-	-	-	-	-	-	-	-	-
N112/W99, L1	26	-	2	-	-	-	-	-	-	-
N112/W99, L2	33	1	2	-	-	-	-	-	-	-
N112/W99, L3	12	-	2	-	-	-	-	-	-	-
N112/W99, L4	9	-	-	-	-	-	1	-	-	-
N113/W95, L1	8	-	-	-	-	-	-	-	-	-
N113/W95, L2	10	-	-	1	-	-	-	-	-	-
N113/W95, L3	8	-	-	-	-	-	-	-	-	-
N113/W95, L4	3	-	-	-	-	-	-	-	-	-
N113/W95, L5	2	-	1	-	-	-	-	-	-	-
N113/W96, L1	17	3	-	-	-	-	-	-	-	-
N113/W96, L2	5	-	2	-	-	-	-	-	-	-
N113/W96, L3	-	-	-	-	-	-	-	-	-	-
N113/W96, L4	4	-	-	-	-	-	1	-	-	-
N113/W97, L1	17	2	1	-	-	-	-	-	-	-
N113/W97, L2	8	-	2	-	-	-	-	-	-	-
N113/W97, L3	23	-	-	-	-	-	-	-	-	-
N113/W97, L4	7	-	-	-	-	-	-	-	-	-
N113/W98, L1	28	-	-	-	-	-	-	2	1	-
N113/W98, L2	27	-	1	-	-	-	-	1	-	-
N113/W98, L3	14	-	-	-	-	-	-	-	1	-
N113/W98, L4	7	-	-	-	-	-	-	1	-	-
N113/W99, L1	22	-	-	-	-	-	-	-	-	-
N113/W99, L2	24	-	-	-	-	-	-	-	-	-
N113/W99, L3	8	-	-	-	-	-	-	1	-	-
N113/W99, L4	14	-	-	-	-	-	-	-	-	-
N113/W100, L1	10	-	-	-	-	-	-	-	-	-
N113/W100, L2	9	-	-	-	-	-	-	-	-	-
N113/W100, L3	6	-	1	-	-	1	-	-	-	-
N113/W100, L4	5	1	-	-	-	-	-	-	-	-
N114/W95, L1	9	-	-	-	-	-	-	-	-	-
N114/W95, L2	10	-	3	-	-	-	-	1	-	-
N114/W95, L3	13	-	2	-	-	-	-	1	-	-
N114/W95, L4	10	-	-	-	-	-	-	-	-	-
N114/W96, L1	26	2	2	1	1	-	-	1	-	-
N114/W96, L2	15	-	-	-	-	-	1	-	-	-
N114/W96, L3	9	-	-	-	-	-	-	-	1	-
N114/W97, L1	30	-	-	-	-	-	-	-	1	-
N114/W97, L2	24	-	2	-	-	-	-	-	-	-
N114/W97, L3	8	-	-	-	-	-	-	-	-	-
N114/W98, L1	18	-	-	-	-	-	-	-	-	-
N114/W98, L2	21	2	1	-	-	-	-	1	-	-
N114/W98, L3	21	2	1	-	-	-	1	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N114/W98, L4	3	-	-	-	-	-	-	-	-	-
N114/W99, L1	27	-	1	-	-	-	-	-	-	-
N114/W99, L2	12	1	-	-	-	-	-	-	-	-
N114/W99, L3	13	-	1	-	-	-	-	-	-	-
N114/W99, L4	20	-	-	-	1	-	-	-	-	-
N114/W99, L5	1	-	-	-	-	-	-	-	-	-
N114/W100, L1	26	-	-	-	1	-	-	-	3	-
N114/W100, L2	15	-	-	-	-	-	-	-	-	-
N114/W100, L3	12	1	2	1	-	-	-	-	-	-
N114/W100, L4	5	1	-	-	-	-	-	1	-	-
N114/W100, L5	5	2	-	-	-	-	-	-	-	-
N115/W95, L1	7	-	-	-	-	-	-	-	-	-
N115/W95, L2	16	1	1	-	-	-	-	-	-	-
N115/W95, L3	14	-	-	-	-	-	-	-	-	-
N115/W95, L4	6	-	2	-	-	-	-	-	-	-
N115/W96, L1	2	-	-	-	-	-	-	-	-	-
N115/W96, L2	9	1	-	-	-	-	-	-	-	-
N115/W96, L3	20	-	-	-	-	-	-	-	-	-
N115/W96, L4	7	-	1	-	-	-	-	-	-	-
N115/W96, L5	10	-	-	-	-	-	-	-	-	-
N115/W97, L1	4	-	-	-	-	-	-	-	-	-
N115/W97, L2	5	-	1	-	-	-	-	-	-	-
N115/W97, L3	28	-	-	-	-	-	-	-	-	-
N115/W97, L4	14	-	1	-	1	-	-	-	-	-
N115/W97, L5	9	3	-	-	-	-	-	-	-	-
N115/W98, L1	6	-	1	-	-	-	-	-	-	-
N115/W98, L2	12	-	1	-	-	-	-	1	-	-
N115/W98, L3	16	1	1	-	-	-	-	1	-	-
N115/W98, L4	15	-	-	-	-	-	-	-	1	-
N115/W98, L5	6	-	2	-	-	-	-	1	-	-
N115/W99, L1	29	1	1	-	-	-	-	-	4	-
N115/W99, L2	19	-	-	-	-	-	-	-	-	-
N115/W99, L3	3	-	1	-	-	-	-	-	-	-
N115/W100, L1	9	-	-	-	-	-	-	-	1	-
N115/W100, L2	16	-	-	-	-	-	-	-	1	-
N115/W100, L3	5	-	1	-	-	-	-	-	-	-
N115/W101, L1	5	-	-	-	-	-	-	-	-	-
N115/W101, L2	13	-	1	-	-	-	-	-	-	-
N115/W101, L3	3	-	-	-	-	-	-	-	-	-
N116/W96, L1	9	-	-	-	-	-	-	1	-	-
N116/W96, L2	7	-	-	-	-	-	-	-	-	-
N116/W96, L3	5	-	1	1	-	-	-	-	-	-
N116/W96, L4	5	-	-	-	-	-	-	-	-	-
N116/W96, L5	7	-	-	-	-	-	-	-	-	-
N116/W97, L1	11	-	-	-	-	-	-	-	1	-
N116/W97, L2	19	-	-	-	-	-	-	-	2	-
N116/W97, L3	10	-	1	1	-	-	-	-	1	-
N116/W97, L4	12	-	1	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N116/W97, L5	6	-	1	-	-	-	-	-	-	-
N116/W98, L1	3	-	-	-	-	-	-	-	-	-
N116/W98, L2	12	-	-	-	-	-	-	1	-	-
N116/W98, L3	24	-	4	-	-	-	-	1	-	-
N116/W98, L4	21	1	1	-	-	-	-	-	-	-
N116/W99, L1	31	-	3	1	1	-	-	-	-	-
N116/W99, L2	8	-	1	-	-	-	-	1	-	-
N116/W100, L1	9	1	-	1	-	-	-	-	-	-
N116/W100, L2	19	2	2	-	-	-	-	-	-	-
N116/W101, L1	5	1	-	-	-	-	-	-	-	-
N116/W101, L2	10	-	-	-	-	-	-	-	-	-
N117/W95, L1	11	1	-	-	-	-	-	-	-	-
N117/W95, L2	11	-	-	-	-	-	-	-	-	-
N117/W95, L3	1	-	1	1	-	-	-	-	-	-
N117/W95, L4	9	-	1	-	-	-	-	-	-	-
N117/W96, L1	11	1	1	-	-	-	-	-	-	-
N117/W96, L2	114	6	17	8	-	-	2	-	-	-
N117/W96, L3	16	-	-	-	-	-	-	-	-	-
N117/W97, L1	16	-	-	-	-	-	-	-	-	-
N117/W97, L2	8	-	1	-	-	-	-	-	-	-
N117/W97, L3	15	-	1	-	-	-	1	1	-	-
N117/W97, L4	3	-	-	1	-	-	-	-	-	-
N117/W97, L5	-	-	-	-	-	-	-	-	-	-
N117/W98, L1	18	-	2	-	-	-	-	-	-	-
N117/W98, L2	28	1	3	-	-	-	1	-	-	-
N117/W99, L1	36	1	4	-	-	-	1	1	-	-
N117/W100, L1	19	1	2	1	-	-	-	1	-	-
N118/W95, L1	-	-	-	-	-	-	-	-	-	-
N118/W95, L2	4	-	1	-	-	-	-	-	-	-
N118/W95, L3	11	-	2	-	-	-	-	-	-	-
N118/W95, L4	10	-	2	-	-	-	-	-	-	-
N118/W96, L1	6	-	-	-	-	-	-	-	-	-
N118/W96, L2	11	-	-	-	-	-	-	-	-	-
N118/W96, L3	5	-	1	-	-	-	-	-	-	-
N118/W96, L4	3	-	1	-	-	-	1	-	-	-
N118/W97, L1	30	1	1	-	-	-	-	-	-	-
N118/W97, L2	4	1	1	-	-	-	-	-	-	-
N118/W97, L3	4	-	-	-	-	-	-	-	-	-
N118/W98, L1	24	-	3	-	-	-	-	1	-	-
N118/W98, L2	20	1	1	-	-	-	-	-	-	-
N118/W99, L1	31	-	4	-	-	-	1	-	-	-
N119/W95, L1	7	-	1	-	-	-	-	-	-	-
N119/W95, L2	14	-	1	-	-	-	-	-	-	-
N119/W95, L3	6	-	-	-	-	1	-	-	-	-
N120/W94, L1	11	-	-	-	-	-	-	-	-	-
N120/W94, L2	9	-	1	-	-	-	-	-	-	-
N120/W94, L3	2	-	-	-	-	-	-	-	-	-
N120/W94, L4	1	-	-	-	-	-	-	-	-	-
N120/W94, L5	1	-	-	-	-	-	-	-	-	-
N120/W94, L6	1	-	-	-	-	-	-	-	-	-
N120/W94, L7	4	-	-	-	-	-	-	-	-	-
N120/W94, L8	1	-	-	-	-	-	-	-	-	-
N120/W95, L1	15	-	3	-	-	-	-	-	-	-
N120/W95, L2	10	-	-	-	-	-	-	-	-	-
N120/W95, L3	13	-	3	-	-	-	-	-	-	-
N120/W95, L4	4	-	-	-	-	-	-	-	-	-
N121/W93, S	1	-	-	-	-	-	-	-	-	-
N121/W94, L1	2	-	-	-	-	-	-	-	-	-
N121/W94, L2	7	-	-	-	-	-	1	-	-	-
N121/W94, L3	2	-	-	-	-	-	-	-	-	-
N121/W94, L4	2	-	-	-	-	-	-	-	-	-
N121/W94, L5	1	-	-	-	-	-	-	-	-	-
N121/W94, L6	1	-	-	-	-	-	-	-	-	-
N121/W94, L7	-	-	-	-	-	-	-	-	-	-
N121/W94, L8	3	-	-	-	-	-	-	-	-	-
N121/W95, L1	13	-	-	-	1	-	-	-	-	-
N121/W95, L2	5	-	-	-	-	-	-	-	-	-
N121/W95, L3	2	-	-	-	-	-	-	-	-	-
N122/W94, L1	14	-	-	-	-	-	-	-	-	-
N122/W94, L2	7	-	2	-	-	1	-	-	-	-
N122/W95, L1	4	-	-	-	-	-	-	-	-	-
N122/W95, L2	14	-	7	1	-	-	-	-	-	-
N123/W94, L1	15	-	-	-	-	-	-	-	-	-
N123/W94, L2	10	-	-	-	-	-	-	-	-	-

Unit 3 Excavations:

Provenience	A	B	C	D	E	F	G	H	I	J
N88/W104, L1	19	-	-	1	-	-	-	-	-	-
N88/W104, L2	36	-	2	-	-	-	-	-	-	-
N88/W104, L3	22	1	2	-	-	-	-	-	-	-
N88/W104, L4	21	-	1	-	-	-	-	-	-	-
N88/W105, L1	40	-	3	-	-	-	-	-	-	-
N88/W105, L2	16	-	1	-	-	1	1	-	-	-
N88/W105, L3	26	-	5	1	-	-	-	-	-	-
N88/W105, L4	20	-	-	-	-	-	-	-	-	-
N88/W105, L5	9	-	-	-	-	1	-	-	-	-
N88/W105, L6	5	-	-	-	-	-	-	-	-	-
N88/W106, L1	15	-	-	-	-	-	-	-	-	-
N88/W106, L2	8	1	-	-	-	-	-	-	-	-
N88/W106, L3	22	-	8	1	-	2	-	-	-	-
N88/W106, L4	27	-	2	1	-	-	-	1	-	-
N88/W106, L5	22	-	1	-	-	-	-	-	-	-
N88/W106, L6	5	-	-	-	-	-	-	-	-	-
N88/W107, L1	12	-	-	-	-	-	-	-	-	-
N88/W107, L2	6	-	-	-	-	-	-	1	-	-
N88/W107, L3	5	-	1	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N88/W107, L4	10	-	-	1	-	1	1	-	-	-
N88/W107, L5	12	-	-	-	-	-	-	-	-	-
N88/W107, L6	12	-	-	-	-	-	-	-	-	-
N89/W104, L1	38	-	-	-	-	-	-	-	-	-
N89/W104, L2	21	-	1	-	-	-	-	-	-	-
N89/W104, L3	24	1	7	-	-	-	-	-	-	-
N89/W104, L4	11	-	1	1	-	-	-	-	-	-
N89/W104, L5	3	-	-	-	-	-	-	-	-	-
N89/W105, L1	13	-	1	-	-	-	-	-	-	-
N89/W105, L2	15	-	2	-	-	-	-	1	-	-
N89/W105, L3	20	-	2	1	-	-	-	1	-	-
N89/W105, L4	10	-	-	-	-	-	-	-	-	-
N89/W105, L5	15	-	-	-	-	-	-	-	-	-
N89/W105, L6	2	-	-	-	-	-	-	-	-	-

Sampling Excavations:

Provenience	A	B	C	D	E	F	G	H	I	J
N68/W81, L1	7	-	-	1	-	-	1	-	-	-
N68/W98, L1	14	-	2	-	-	-	-	-	-	-
N68/W98, L2	4	-	-	-	-	-	-	-	-	-
N71/W110, L1	11	1	2	-	-	-	-	-	-	5
N71/W110, L2	3	-	1	1	-	-	-	-	-	-
N71/W110, L3	5	-	-	-	-	-	-	-	-	-
N71/W110, L4	-	-	-	-	-	-	-	-	-	-
N71/W110, L5	2	-	-	-	-	-	-	-	-	-
N84/W76, L1	7	-	-	-	-	-	-	-	-	-
N84/W76, L2	1	-	-	-	-	-	-	-	-	-
N84/W76, L3	-	-	1	-	-	-	-	-	-	-
N84/W92, L1	36	1	-	-	-	-	-	-	-	-
N84/W92, L2	30	1	2	-	-	-	1	-	-	-
N84/W92, L3	32	-	1	-	-	-	-	-	-	-
N84/W92, L4	19	1	-	-	-	-	-	-	-	-
N84/W92, L5	22	-	1	1	-	-	-	-	-	-
N84/W92, L6	9	-	-	-	-	-	-	-	-	-
N84/W92, L7	12	-	-	-	-	-	-	-	-	-
N84/W92, L8	1	-	-	-	-	-	-	-	-	-
N84/W108, L1	34	1	2	1	-	-	1	-	-	-
N84/W108, L2	18	-	-	-	-	1	-	-	-	-
N84/W108, L3	19	1	-	-	-	-	-	1	-	-
N84/W108, L4	3	1	-	-	-	-	-	-	-	-
N84/W124, L1	4	-	1	-	-	-	-	-	-	-
N100/W68, L1	-	-	-	-	-	-	-	-	1	-
N100/W68, L2	1	-	-	-	-	-	-	-	-	1
N100/W84, L1	1	1	-	-	-	-	-	-	1	-
N100/W84, L2	9	-	-	-	-	-	-	-	-	-
N100/W84, L3	14	1	2	-	-	-	-	-	-	-
N100/W84, L4	3	1	-	-	-	-	-	-	-	-
N100/W84, L5	5	-	-	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N100/W102, L1	12	-	-	2	-	-	-	-	-	-
N100/W102, L2	6	2	-	-	-	-	-	-	-	-
N100/W102, L3	11	-	-	1	-	-	1	-	-	-
N100/W102, L4	12	-	-	-	-	-	-	-	-	-
N100/W102, L5	7	1	1	-	-	-	-	-	-	-
N100/W102, L6	8	-	-	-	-	-	-	-	-	-
N100/W102, L7	7	-	-	-	-	-	-	-	-	-
N100/W116, L1	6	-	2	-	-	-	-	-	-	-
N100/W116, L2	18	-	4	4	-	-	1	-	-	-
N100/W116, L3	20	-	2	-	-	1	-	-	-	-
N100/W116, L4	14	1	-	-	-	1	-	-	-	-
N100/W116, L5	4	-	-	-	1	-	-	-	-	-
N100/W116, L6	1	-	1	-	-	-	-	-	-	-
N100/W132, L1	2	-	-	-	-	-	-	-	-	-
N100/W132, L2	1	-	-	-	-	-	-	-	-	-
N100/W148, L1	5	-	-	-	-	-	-	-	-	-
N116/W76, L1	-	-	-	-	-	-	-	-	-	-
N116/W95, L1	17	2	2	-	-	-	-	-	-	-
N116/W95, L2	14	2	4	-	-	-	-	-	-	-
N116/W95, L3	10	-	-	-	-	-	-	-	-	-
N116/W95, L4	9	-	-	-	-	-	-	-	-	-
N116/W108, L1	18	-	-	-	-	-	-	-	-	-
N116/W108, L2	22	3	2	-	-	-	-	1	-	-
N116/W108, L3	8	-	1	-	-	-	-	-	-	-
N116/W108, L4	5	-	-	-	-	-	-	-	-	-
N116/W124, L1	3	-	-	1	-	-	-	-	-	-
N116/W124, L2	4	1	-	-	-	-	-	-	-	-
N116/W124, L3	-	-	-	-	-	-	-	-	-	-
N116/W124, L4	-	-	-	-	-	-	-	-	-	-
N116/W140, L1	1	-	-	-	-	-	-	-	-	1
N116/W140, L2	2	-	-	-	-	-	-	-	-	-
N116/W140, L3	2	-	-	-	-	-	-	-	-	-
N116/W140, L4	2	1	-	-	-	-	-	-	-	-
N116/W140, L5	1	-	-	-	-	-	-	-	-	-
N132/W68, L1	-	-	-	-	-	-	-	-	-	-
N132/W84, L1	18	-	-	-	-	-	-	-	-	-
N132/W84, L2	5	1	-	-	-	-	-	-	-	-
N132/W84, L3	-	1	-	-	-	-	-	-	-	-
N132/W84, L4	3	-	-	-	-	-	-	-	-	-
N132/W100, L1	18	-	3	-	-	1	-	-	-	-
N132/W100, L2	2	-	-	-	-	-	-	-	-	-
N132/W100, L3	6	-	1	-	-	-	-	-	-	-
N132/W100, L4	3	-	-	-	-	-	-	-	-	-
N132/W116, L1	15	-	-	-	-	-	-	-	-	-
N132/W116, L2	-	-	-	-	-	-	-	-	-	-
N132/W116, L3	2	-	-	-	-	-	-	-	-	-
N132/W132, L1	4	-	-	-	-	-	-	-	-	-
N148/W92, L1	14	-	-	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
N148/W92, L2	8	-	1	-	-	-	-	-	-	-
N148/W92, L3	4	-	-	-	-	-	-	-	-	-
N148/W108, L1	3	-	-	-	-	-	-	-	-	-
N148/W108, L2	5	-	-	-	-	-	-	-	-	-

Phase I Excavations:

Provenience	A	B	C	D	E	F	G	H	I	J
N92/W92, L1	120	-	2	-	-	-	-	1	1	-
N92/W92, L2	57	2	5	-	-	-	-	-	-	-
N92/W92, L3	25	-	2	-	-	-	-	-	-	-
N92/W92, L4	-	-	-	-	-	-	-	-	-	-
N99/W131, L1	7	-	-	-	-	-	-	-	-	-
N100/W78, L1	12	-	2	-	-	-	-	-	-	-
N106/W99, L1	-	-	-	-	-	-	-	-	1	-
N106/W99, L2	31	-	3	-	-	-	-	-	-	-
N106/W99, L3	3	-	1	-	-	-	-	-	-	-
N106/W99, L4	2	-	-	-	-	-	-	-	-	-

Surface Feature Excavation:

Provenience	A	B	C	D	E	F	G	H	I	J
F-10, L1	11	-	-	-	-	-	-	-	-	-
F-10, L2	13	-	-	-	-	-	-	-	-	-
F-10, L3	6	-	-	-	-	-	-	-	-	-
F-10, L4	3	-	-	-	-	-	-	-	-	-
F-11, L1	17	-	1	-	-	-	-	-	-	-
F-11, L2	5	-	-	-	-	-	-	-	-	-
F-11, L3	6	-	-	-	-	1	-	-	-	-
F-11, L4	3	-	-	-	-	-	-	-	-	-
F-11, L5	2	1	-	-	-	-	-	-	-	-
F-11, L6	1	-	-	-	-	-	-	-	-	-
F-12, L1	29	-	-	-	-	-	-	-	-	-
F-12, L2	11	-	-	-	-	-	-	-	-	-
F-12, L3	1	-	-	-	-	-	-	-	-	-
F-6, L1	3	-	-	-	-	-	-	-	-	-
F-6, L2	7	1	1	1	-	-	-	-	-	-
F-6, L3	5	-	-	-	-	-	-	-	-	-
F-6, L4	5	-	-	-	-	-	-	-	-	-
F-6, L5	4	-	-	-	-	-	-	-	-	-
F-15, L1	1	-	-	-	-	-	-	-	-	-
F-15, L2	2	-	-	-	-	-	-	-	-	-
F-15, L3	-	-	-	-	-	-	-	-	-	-
F-7, L1	1	-	-	-	-	-	-	-	-	-
F-7, L2	-	-	-	-	-	-	-	-	-	-
F-7, L3	2	-	-	-	-	-	-	-	-	-
F-13, L1	21	-	-	-	-	-	-	-	-	-
F-13, L2	9	1	-	-	-	-	-	-	-	-
F-13, L3	6	-	-	-	-	-	-	-	-	-
F-13, L4	11	-	-	-	-	-	-	-	-	-

Provenience	A	B	C	D	E	F	G	H	I	J
F-8, L1	14	-	-	1	-	-	-	-	1	-
F-8, L2	8	-	1	-	-	-	1	-	-	-
F-8, L3	6	-	-	-	-	-	-	-	-	-
F-14, L1	3	-	-	-	-	-	-	-	-	-
F-14, L2	4	-	-	-	-	-	-	-	-	-
F-9, L1	11	-	1	-	-	-	-	-	-	-
F-9, L2	3	-	-	-	-	-	-	-	-	-
F-9, L3	2	1	-	-	-	-	-	-	-	-
F-9, L4	5	-	-	-	-	-	-	-	-	-
F-9, L5	3	-	-	-	-	-	-	-	-	-
F-16, L1	2	-	-	-	-	-	-	-	-	-

Miscellaneous Proveniences:

Provenience	A	B	C	D	E	F	G	H	I	J
BHT A	3	-	2	-	1	1	-	-	-	-

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8